MAR 2 5 1982

TD 257.5
ORIGINAL

U.S. Department of Transportation
Federal Highway Administration

Statewide Transportation Planning and Management Series

State Transportation Agencies: Organization and Management

COMPLETED
102

Report #5

MARCH 1982

The Statewide Transportation Planning and Management series presents papers primarily from State transportation agency personnel on statewide planning and programing activities, techniques, and procedures. The purpose of this series is to provide an opportunity for State planners to share some of their successful efforts in undertaking key planning activities or in addressing planning issues. Papers of particular interest are those discussing activities such as jurisdictional responsibility for transportation systems, financial planning, system planning, programing, and surveillance and evaluation. Other desirable papers include discussions of statewide planning efforts in strategic planning, pavement management, intergovernmental coordination, economic development, public involvement, and intermodal coordination.

The Federal Highway Administration welcomes the submittal of papers for publication in the Statewide Transportation Program Management series. Also, comments on the papers included in this series are welcomed. Papers and comments should be sent to the Federal Highway Administration Division Office located in each State or to:

Federal Highway Administration
Office of Highway Planning
Program Management Division (HHP-15)
Washington, D.C. 20590
Telephone Number 202/426-1045

STATE TRANSPORTATION AGENCIES:

ORGANIZATION AND MANAGEMENT

Prepared by

U.S. Department of Transportation

Federal Highway Administration

Program Management Division - HHP-13

March 1962

I

TABLE OF CONTENTS

	Pages
Introduction	iii
Organization and Management of a Typical Highway Agency	1
Managing for Accomplishment (Kansas)	21
Decisionmaking System (Florida)	27
Program Development And Management: Pennsylvania's Integrated Organizational Approach	41
Matrix Project Management in Transportation: New York State Experience	59
Considerations in Organizing State Transportation Agencies	67
The Role of Planning in State Transportation Organizations	77

INTRODUCTION[1/]

The environment in which State transportation agencies must operate is undergoing economic, social, cultural, and political change at an accelerating rate. In addition, the management of a typical State transportation program and organization is more complex and demanding than that of most corporations. For instance, the typical agency program is for 5 years; must cover many program categories, with dozens to hundreds of projects in each category, using funds from several sources; and must be responsive to many public agencies and private interest groups. Further, the delivery of such a program has been exacerbated during the past 2 decades by:

- Rapidly rising construction, operation, and maintenance costs.
- Constantly changing system improvement needs and service demands, which must be identified, assessed, and planned for years in advance.
- Insufficient public understanding of the complexities involved in developing and maintaining an effective and efficient transportation system.

State transportation agencies must be able to cope with this complex and continually changing milieu. They must be able to understand the present environment and anticipate changes. Then, with this background, they must be able to define the relevant issues, agency policy and programs, and organizational structures and processes for addressing the present and anticipated environments based on the agency's mission or purpose. For this, these agencies need effective organization and management concepts, procedures, and practices. Unfortunately, their use has lagged developments in technical areas, and consequently, transportation agency managers must "catch up" on developments in management areas as well.

[1/] Comments by O. D. Turner on the draft of this report provided much of the introductory material.

State transportation agencies, in an attempt to catch up, are developing agency mission and policy statements, comprehensive data bases, and compatible analysis procedures for use by their top management in strategic planning and decisionmaking. Further, they are developing organizational structures and processes to support the strategic planning and decision processes. In addition, these structures and processes integrate program and financial planning within a realistic resource allocation decision process and provide means for communicating the data and decisions to the governor's office, the legislature, and the general public. This communication increases the understanding of the issues and it establishes agency credibility.

In particular, the Florida and Pennsylvania DOT's have improved their organizational performance through formal decisionmaking by committees of top management. These committees, working with staff support, do strategic planning for each agency. The Florida Executive Committee concentrates on the analysis of the agency's environment, anticipates issues, and sets policy accordingly. The Pennsylvania Program Management Committee began by focusing on its internal operation to gain better control of the department's program and expenditures. Both States have adopted the same general structure, a top management committee, but each has a significantly different purpose. Pennsylvania's purpose is to manage a severe financial problem, whereas Florida's purpose is to exploit opportunities and detect problems early.

The relationship of these strategic planning efforts (policy planning by Florida DOT and program planning by Pennsylvania DOT) to other management activities is shown in figure 1, Transportation Program Management. These activities are further defined in table 1. With the possible exceptions of formal policy and program planning these activities and their relationships are common among State transportation agencies, regardless of how each agency is formally organized to carry out these activities.

Finally, another element of organization change, human behavior, must be considered, as it has significant impact on the overall performance of any organization. Specific items to be considered are:

BEST DOCUMENT AVAILABLE

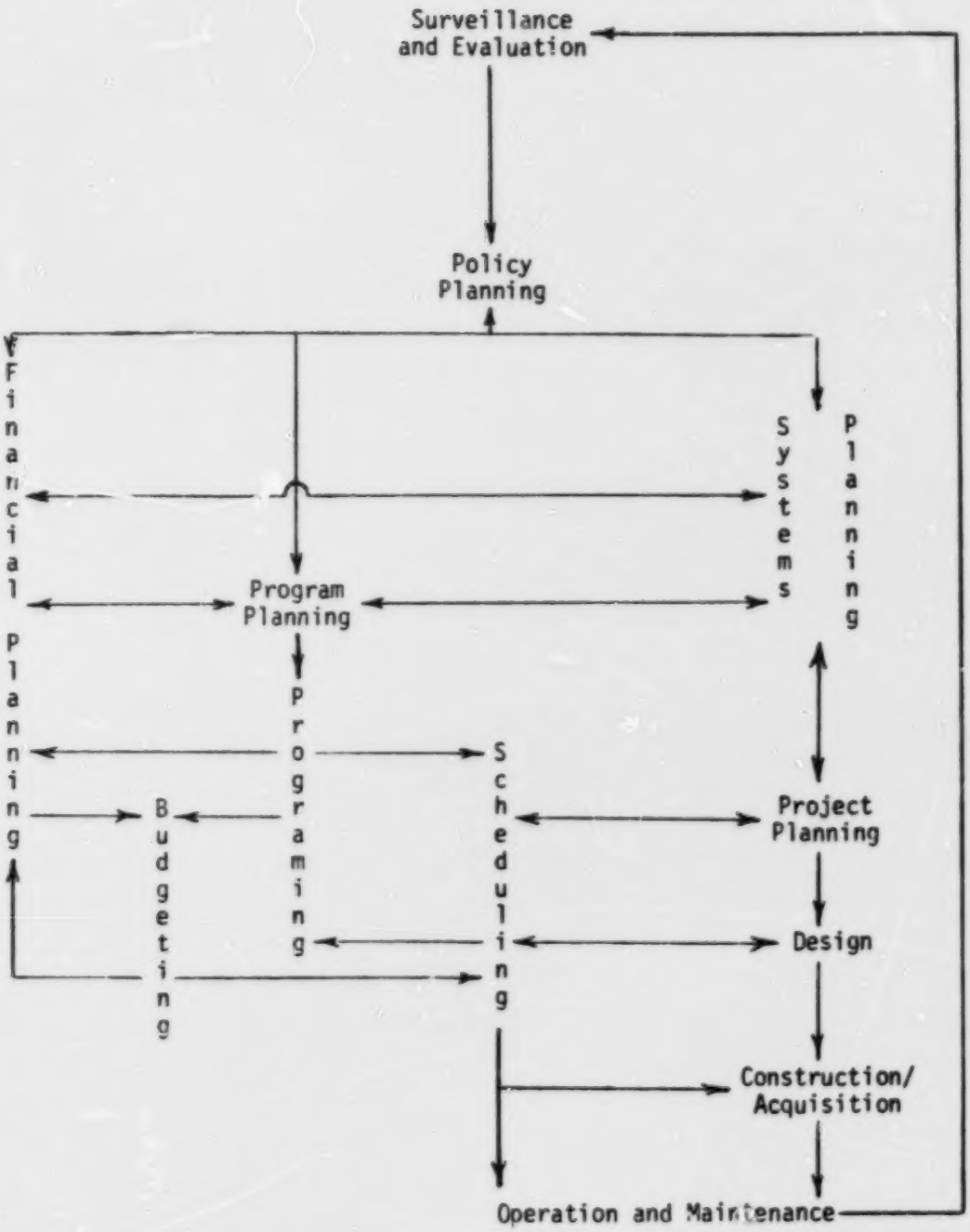


Figure 1 - Transportation Program Management

Table 1. - Management Activities

Surveillance and Evaluation

- Periodic monitoring of
  - System performance
  - System Condition
  - Development patterns
  - Travel demand and related factors
  - Revenues and costs
  - Environmental factors
- Analysis of collected data to assess highway program results and need for changes in
  - Policies
  - Financing
  - Plans
  - Programs

Policy Planning

- Provides analysis for and results in open ended policies on
  - Agency objectives
  - Tradeoffs between State and Local concerns, including jurisdictional responsibilities
  - Intermodal relationships
  - Regulations
  - System classifications and standards
  - Revenue sources and tax rates
- Coordination with other State agency plans and programs

Financial Planning

- Identifies revenue sources
- Allocates cost responsibility and sets user charges
- Forecasts revenues
- Monitors cash flow and funding needs

System Planning

- Determines new facilities, facility improvements, or facility maintenance needed at State, regional, or local levels
- Many system planning efforts can occur concurrently at different jurisdictional levels
- Generally modal specific at State level, multimodal at regional, and modal specific at local level

Program Planning

- Decision process by agency's top management on the timing and funding for specific programs and major projects
- Pulls system planning efforts together

Programming - Schedules/reschedules development phases of projects identified by systems planning by funding categories based on:
  - Policies/priorities
  - Funds available
  - Staff available
  - Project development progress
  - Involvement of interested agencies and parties

Scheduling

- Develops operations plan for controling project development phases
- Coordinates project development and implementation with available funds
- Monitors progress of projects as they proceed through development phases
- Provides control of agency operations for management

Project Planning-The refinement of systems planning for major projects which:
  - Considers social, economic, and environmental consequences of alternative approaches including mode and location for proposed projects
  - Uses interdisciplinary skills and systematic procedures
  - Involves interested agencies and parties through public hearings and other means and also considers any resulting comments

Design

- Establishes capacity and physical (geometric alinement and pavement for highways) and operational features after considering alternatives
- Results in plans, specifications, and estimate for construction or procurement contracts

Construction/Acquisition

- Inspection of work during construction or manufacture
- Final Acceptance of work

Operation and Maintenance

- Manages traffic's use of facilities
  - Traffic Control
  - HOV Lanes
  - Vehicles size and weight endorcement
- Schedules public transportation vehicles
- Maintains facilities and vehicles in servicable condition

BEST DOCUMENT AVAILABLE

- The effectiveness, efficiency, and style of top management.
- The recognition and accommodation to the extent practical of employees' personal goals.
- The development of personnel to meet future organizational needs.

This report includes seven papers concerning the organizational structures and processes of State transportation agencies. The first paper describes how a typical highway agency is organized and managed today. The second discusses the Kansas DOT approach to management by objectives, called management by accomplishment. The third by Florida DOT and the fourth by Pennsylvania DOT have already been mentioned. The fifth describes how New York State uses matrix management to advance projects through their development phases. The sixth proposes considerations for organizing State transportation agencies in general, and the seventh paper discusses planning's role in State transportation agencies.

ORGANIZATION AND MANAGEMENT OF A TYPICAL HIGHWAY AGENCY[1/]

INTRODUCTION

A discussion of the organization and management of a typical State highway agency should begin with a brief review of the origins of State highway organizations spanning the 25 years between 1890 and 1915. During this period, the planning, financing, and building of public roads were accepted for the most part as responsibilities of State governments. Also, during this same period, a role emerged for the Federal government. Similarly, an awareness of expanding requirements and complexities in highway transportation development during the ensuing decades is necessary in the discussion of a typical, modern State highway agency. Finally, comments on the impact of new requirements and complexities upon the need for multidisciplinary specialists in highway program management completes the setting.

Each of the 50 States, the District of Columbia and Puerto Rico[2/] has a highway organization with programs, management systems, and procedures for planning and executing projects. No two States have identical highway organizations and management processes. Therefore in fact, what are described in this discussion of the "Organization and Management of a Typical Highway Agency" are current organizational arrangements and managerial principles and methods generally characteristic of these highway agencies.

The accommodation of changing transportation demand, more sophisticated and comprehensive planning, and technological advances in transportation systems engineering require organization and management adjustments. Further, changes in public agencies take place in response to a wide variety of political, public, budgetary, and legislative pressures. Shifts in the political power structure in

[1/] This paper was edited from one with the same title by James B. Lancaster, Jr. and Richard V. Woodruff, Federal Highway Administration, which was presented at the Fourth International Road Federation Conference, January 1979.

[2/] The District of Columbia and Puerto Rico are considered States for this discussion.

State governments may bring changes in the top echelons of administration. These changes are invariably accompanied by organizational, administrative and personnel adjustments to accommodate commitments made by the new political leaders. Public criticism of highway improvement programs compel officials to take corrective action. Severe fiscal constraints may have to be imposed, in response to public outcries for tax relief and economies in government. Finally legislative changes to program functions and objectives always require consideration of their impact on organizational structure and management processes. Usually, the response to these forces for change starts with examining the functions, administrative procedures and controls, and the competency of the highway staff. Reorganization then follows.

The universal impact of the many factors that precipitate change results in as many differences as there are similarities in the major organization and management characteristics of State highway agencies. Thus for this paper, a "typical" highway agency is a composite of the organization and management features that predominate in these agencies. This in not to imply that the "typical" agency represents the most advanced state-of-the-art. It merely indicates which organizational arrangements and management processes are most favored among the 52 agencies at this time.

ORIGINS OF STATE HIGHWAY ORGANIZATIONS

The origins of State highway organizations in the United States stem from the period when State governments began to participate financially in the development of roads and exercise related controls. Rural roads in the last century were uniformly bad. In the northern States, earth roads became impassable during the spring thaws. In many parts of the southern States, deep sand was a problem. In either situation, the loads that a farmer could carry - when it was possible at all - were only a small fraction of what they could be on reasonably good roads. It was not until the 1890's that the voices demanding good roads began to be heeded by the States.

One of the strongest arguments for good roads was they would reduce the isolation of the rural population and, in particular, make rural mail delivery practical. By 1917, all of the States had enacted laws establishing some form of State highway organization for assisting local governments in developing roads.

At the beginning of this century, automobiles began to appear in the United States in rapidly increasing numbers. In 1900, there were approximately 8,000 automobiles concentrated in the major cities. Affordable only by the wealthy, they were used for personal convenience and pleasure and travel was largely confined to city streets. Shortly, however, automobile owners began traveling into the country where roads designed and constructed primarily for horse and wagon traffic were woefully inadequate for the motor vehicles. This rural travel and the explosive growth of automobiles (annual production grew to 25,000 vehicles in 1905; 187,000 in 1910; and 970,000 in 1915) intensified the need and pressures for better roads. By 1910, there were many organizations whose sole purpose was to promote good roads.

Stemming from this movement, officials from many State and interstate organizations formed the American Association for Highway Improvement in 1910. Among the resolutions passed during the first Congress of this organization were:

- No appropriation for road construction should ever be made without proper provision for maintenance.

- All States provide for State supervision of main highways through a State highway department, and liberal financial assistance be given through State aid in the building and maintenance of such roads.

- The work of construction and maintenance of all public highways of any localities or State should be under the direction of experienced highway engineers.

These resolutions and the American Association of State Highway Officials, which branched off in 1914, have been highly effective and influential in highway transportation development in the United States.

The earliest State highway organizations were directed by either a single commissioner or a multimember commission. Although many State agencies continue to be directed by single executives, the majority today are under some degree of multimember commission control. The five generally recognized classifications of independent highway organizations that prevailed until the 1960's, when multimodal State departments of transportation began to emerge were:

- Single executive.
- Single executive with an advisory board or commission.
- Single executive and a commission in coordinate capacities.
- Limited control commission with an appointed (by the commission) executive administrative officer.
- Administrative commission exercising considerable control, with a full-time chairman as chief administrative officer.

The concept of unified, multimodal State departments of transportation has now become predominant in patterns of organization. In varying formats, 42 States conduct their highway programs within department of transportation organizational structures. Generally, the States group the highway function with other transportation modes and, in some States, with public works activities. Some also include vehicle registration, driver licensing and highway patrol. Additional characteristics of these DOT's include centralization of selected activities that are common to all program functions, such as planning and administrative services.

EXPANDED REQUIREMENTS AND COMPLEXITIES IN HIGHWAY TRANSPORTATION DEVELOPMENT

Historically, State highway agencies needed little more than the appropriate engineering skills and the necessary labor forces to design and construct roads. The sole objective was to facilitate movement from one place to another. Becoming aware of adverse social, economic, and environmental effects and the rising pressures for their consideration was a gradual process. The evolution of the highway program to incorporate such issues as urban transportation development, environmental protection, safety improvements, and other diverse concerns required commensurate staff capabilities leading to the need for complex interdisciplinary approaches to planning.

In commenting on expanded requirements in highway development, the role of the Federal government is recognized. The Federal Aid Road Act of 1916 marked the beginning of uninterrupted Federal financial aid to the States and established the principle of an equal Federal-State partnership in the development of a nationwide system of highways. Many of these requirements affecting highway development were initiated in Federal highway or other Federal legislation. Consequently, as the State organizations are responsible for implementing highway programs, new programs and requirements must be reflected in State highway organizational structures and program management functions.

Further, planning has increased in scope and complexity to encompass considerations broadly related to highway programs. For example, since 1962, States and local communities have had to develop cooperatively long range highway plans and programs in urban areas of 50,000 or more population and coordinate them with other transportation programs, particularly mass transit. Thus, State highway agencies have found it necessary to advance their planning capabilities, employing more sophisticated planning technology.

Since 1970, the social, economic, and environmental impacts of each proposed highway project have been considered in its planning, design, or implementation decision. In recent years, numerous other requirements for the protection and preservation of the natural environment specifically navigable waters, marine and animal wildlife, and air and water quality have been enacted. These measures complicate and extend the processes of highway planning, design, construction, and maintenance.

NEED FOR MULTIDISCIPLINARY SPECIALIZATION IN HIGHWAY PROGRAM MANAGEMENT

Over the decades, highway organizations have found it necessary to add specialists with expertise in disciplines other than engineering. These include economists, landscape architects, real estate appraisers, behavioral scientists, planners, historians and ecologists. However, corresponding organization and management concepts did not keep pace with the expanding program. Moreover, the earlier and almost exclusive emphasis on the technical aspects of highway development tended to obscure the organization and management implications. Considerations of organizational structure, management systems, procedural controls and checks and other principles of sound administration designed to achieve more effective program planning and execution were overlooked or insufficiently understood. Yet the accomplishments of an organization are immediately and directly affected by its design and management processes.

Highway administrators have only recently accepted the importance of sound organization planning and management principles. Until about 1960 many State highway officials were attempting to cope with the greatest challenges (e.g., the Interstate Highway Program) in the history of highways with inadequate organizations and procedures. The growing appreciation among political leaders and highway administrators of the need to modernize their organizations and management practices largely explains the recent efforts to reorganize State highway agencies. Today engineering and related technical skills are not sufficient to meet the complex program requirements and the demands for greater effectiveness in governmental operations. The application of accepted principles of administration and the employment of necessary specialized skills are critical for meaningful improvement in highway program management.

The sources of professional and technical personnel trained in areas of management have expanded notably in recent decades. Increasingly, universities and other external training institutions have added to and tailored their post-graduate and special programs curricula to meet needs for specialists in the management of government organizations. In addition, internal government training activities are oriented to meet specific needs of agency mission, objectives and management systems and processes. Since management positions in technical highway program areas are necessarily filled from the ranks of engineering and related technical personnel, State government education and training activities provide these potential managers with background in organization and management theory, and such management functions as personnel, financial administration, and public relations.

ORGANIZATION AND MANAGEMENT OF A TYPICAL HIGHWAY AGENCY

In establishing a Department of Transportation (DOT) in 1960, Hawaii became the first State to combine its highway operations with those of other, nonhighway transportation modes. Following Hawaii's lead, the formation of State multimodal departments of transportation increased rapidly. At the present time, there are 31 State DOT's. An additional 11 States have established multimodal agencies under other titles, but the underlying purposes are similar. As examples, a few are named Department of Highways and Public Transportation; another is titled Department of Transportation and Development. Ten States retain singlemode highway agencies. For the most part these States are relatively rural, where highway needs dominate transportation priorities. Consequently, the need for coordinated multimodal transportation planning is not as compelling as in other States. The reason given for combining modes into a single agency are that planning and programming on a multimodal basis will reduce duplication of service, increase efficiency in management, promote better coordination of all transportation activities, facilitate the integration of competition for transportation funds and provide better balanced and, therefor, more effective transportation systems.

Although there are a number of variations among the State DOT's, a common characteristic of nearly 80 percent of the State highway agencies is that they participate with other modes in coordinated multimodal transportation planning,

program formulation, resources mobilization and allocation, and program execution. This preponderance of State DOT's indicates that the principal feature of a "typical" highway agency is its combination with other transportation modes in a unified organizational structure.

Executive Authorities

There are two basic statutory arrangements governing executive authority in State DOT's. In the first, a commission or board is prescribed, usually consisting of 3 to 20 members. These exist in about two thirds of the State DOT's. The responsibilities and authorities of these commissions vary over a wide range of combinations. In some States, the commissions serve in purely advisory roles. In other States, they have authorities beyond advice but are restricted to specified matters such as bridges, turnpikes, parkways, and tollroads. When departments of transportation were created, these authorities were incorporated into the DOT but retained the powers necessary to discharge their statutory responsibilities. As these groups are unique in the terms described, we may disregard them in the further discussion of executive authorities. At the other end of this scale, the commissions in some States have broad statutory policy and programming authorities. They have extensive input to the day-to-day operations of the DOT. These powers include establishing the system of highway routes and extend to opening, relocating, altering, vacating or abandoning portions of routes; allocating money for highway improvements; and developing multimodal construction programs. The day-to-day administration of commission policies and decisions is directed by the executive. Between these extremes there are variations with respect to degrees of authority and responsibility. It is not likely that an exhaustive study of the commissions in State DOT's would produce a supportable conclusion on their predominant form or authority. Furthermore, determinations about what is appropriate in a particular State DOT are made by political leaders, based upon their perceptions of complex, subjective political questions.

The second basic arrangement for delegating executive authority is the single executive system. About one third of the State DOT's use single executives. These chief executive officers (variously titled Secretary, Commissioner or Director) are appointed by and responsible to the governor. Supporters of the single executive approach point out that the efficiency of administrative operations is enhanced if the authority to make decisions and take actions is vested

in a single executive, as opposed to the processes of group deliberations to reach consensus on major decisions. Also, since the chief executive officer is responsible to the governor, the department will necessarily be responsive to public opinion. The governor's mandate is to insure that all State agencies are discharging their responsibilities in keeping with the public's desires and expectations. A disadvantage of the single executive is that judgments are not as comprehensively formulated and balanced as is the case with the commission arrangement. That is, the public interest is more likely to be correctly ascertained by a commission whose members represent a broader spectrum of the interests involved.

Basic Organizational Structures

The 42 State DOT's may be grouped into three categories of organizational structures - modal, functional, and mixed. These are depicted in figure 1 and generally described as follows:

- In the modal organization, the modes that were incorporated into the DOT have been left essentially intact. Staff offices reporting to the chief executive officer are established to provide agency-wide services which apply to all the modes, such as legal and public information services.

- In the functional organization, the identities of the individual modes disappear. The modes are divided into major activities (such as planning, program development, construction and administration) which then become the functional components of the overall DOT organizational structure. In this structure, previously separate staff and housekeeping functions are also consolidated.

- The mixed organization contains characteristics of the modal and functional categories. Usually, at least the planning and administrative activities are separated from the individual modes and combined into major organizational elements for providing services to the entire DOT organization. Otherwise, the identity and functions of individual modes are retained.

BASIC ORGANIZATIONAL STRUCTURE OF STATE DEPARTMENTS OF TRANSPORTATION

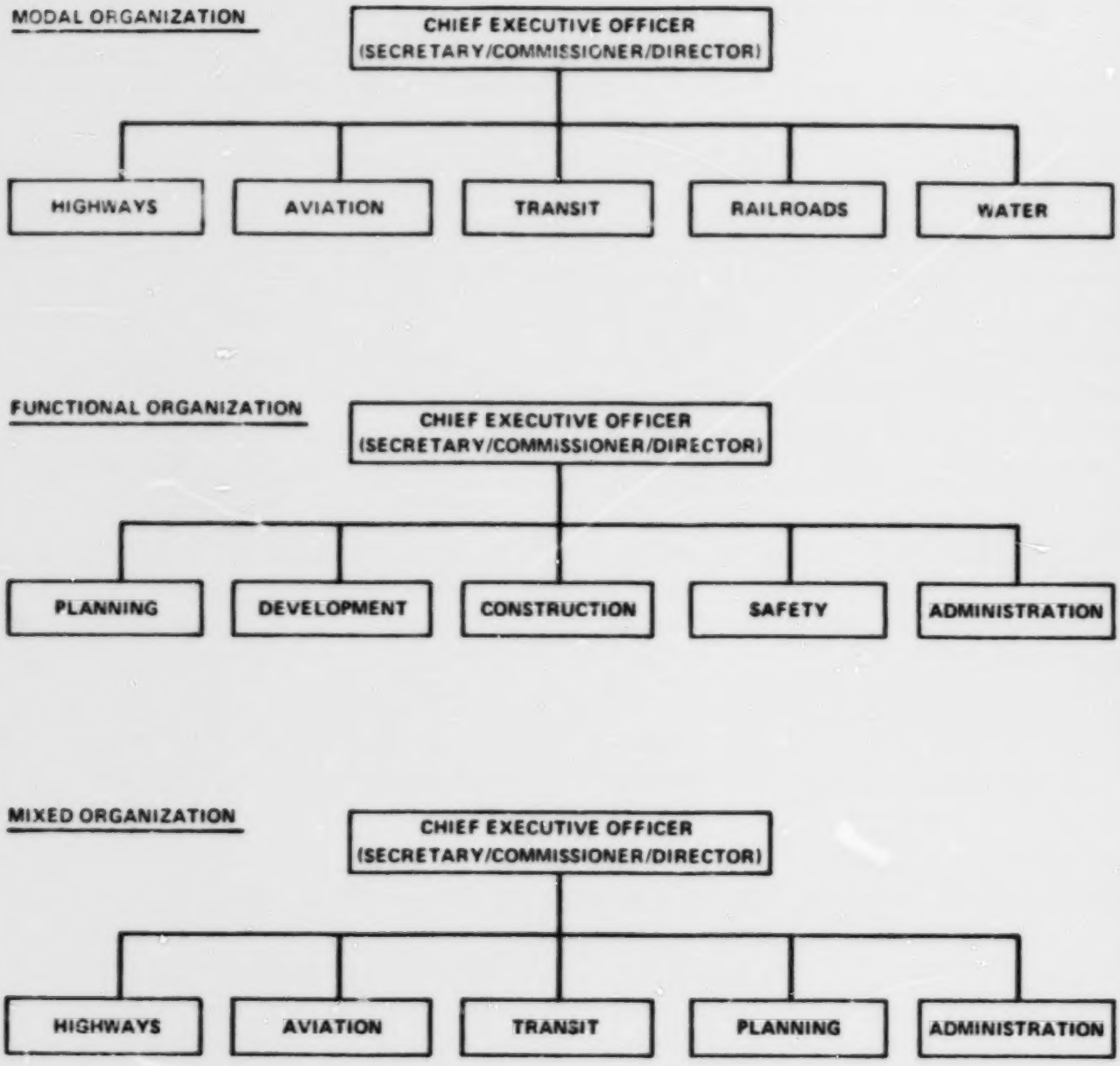


FIGURE 1.

BEST DOCUMENT AVAILABLE

Major Organizational Elements

The first level of organization subordinate to the chief executive officer comprises the major organizational elements. All of the department's functions are distributed among the major elements (except those performed by statutory commissions). Each element is a discrete assembly of some number of interrelated but clearly identified activities. The directors of major elements formally report to the chief executive officer or his deputy.

In theory, authority should be delegated downward to the maximum extent practicable for achieving effective direction and control of operations and as close as possible to the point where functions are performed. Within the limits of assigned responsibilities and delegated authorities, office directors and subordinates to whom authorities have been further delegated are accountable for the activities of their respective elements and subelements. The number of major element directors reporting to the chief executive officer in the 20 State DOT's identified as a sample for further examination ranges from 4 to 14. The median is 10. Thus in the typical State DOT, the chief executive officer relies upon 10 senior officials for the management of all aspects of the department's program.

As depicted in figure 2, program planning and administration functions applicable to all modal elements are consolidated for the provision of services on a department-wide basis. This arrangement is found in all 20 of the State DOT's reviewed. Similarly, a majority of the States have consolidated such other staff functions as internal audit, legal services and public information activities. A lesser number of States have also elevated the functions of personnel management, civil rights and safety to the status of major organizational staff elements.

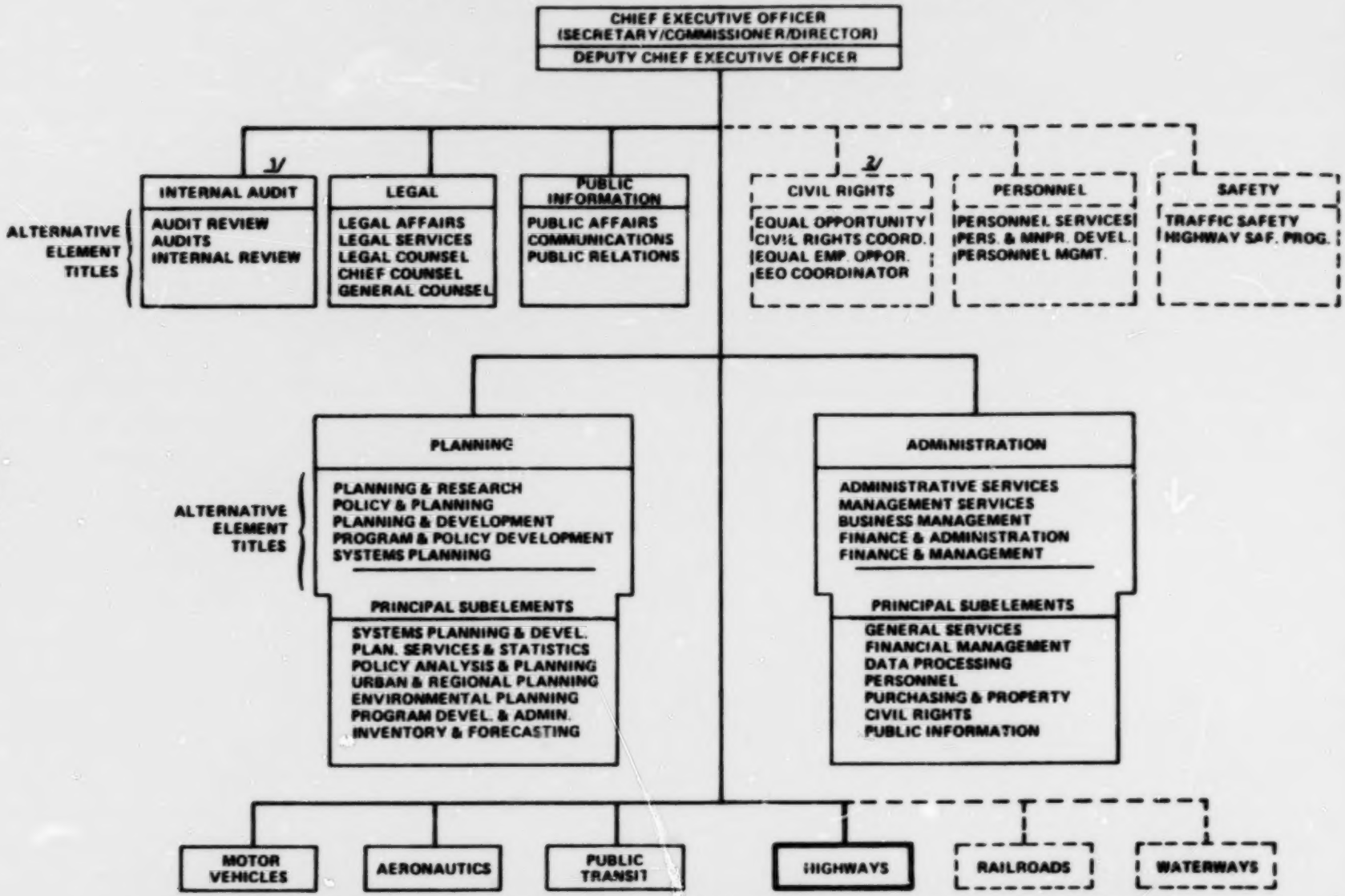
Organization of Highway Agencies

In broad terms, the functions performed in the highway program elements of all State DOT's are the same; the highway agencies plan, design, construct, and maintain highways and structures, and in the process, discharge ancillary requirements having to do with right of way, environmental controls, safety considerations, relationships with the Federal agencies and local governments, and so forth. Beyond this, however, the differences among the state organizational arrangements exceed the similarities. In addition, various titles designate the organizational elements. For example, the several functions associated with preconstruction may be termed as development, engineering, or design.

BEST DOCUMENT AVAILABLE

Finure 2

TYPICAL ORGANIZATIONAL STRUCTURE OF STATE DEPARTMENTS OF TRANSPORTATION



1/ ELEMENTS IN SOLID LINES ARE REPRESENTED IN MORE THAN ONE-HALF OF THE STATE DEPARTMENTS OF TRANSPORTATION.
2/ ELEMENTS IN DOTTED LINES ARE REPRESENTED IN ONE-FOURTH TO ONE-HALF OF THE STATE DEPARTMENTS OF TRANSPORTATION.

The typical organizational structure and representative functions displayed in figure 3 are a composite picture of predominant groupings of functions into major organizational elements as they are found in the organization charts of 20 highway agencies. This chart does not represent or advocate a model state highway agency in the sense of depicting an organizational structure that may be presumed more effective than alternative structures for administering highway programs. It shows, however, the groupings of functions that are favored among most State DOT's.

The most significant variable in the highway program director's span of control is the organizational level of field offices. In a majority of the States the heads of field offices are at the first level of organization, reporting directly to the highway director. In the remaining States, they are located at the second level of organization, usually in a highway operations element.

Altogether, nearly 30 titles for major organizational elements were identified. Of these only eight appear more than once. Many of the titles are similar and include substantially the same functions, such as construction and construction/materials, engineering and engineering and design, operations and operations and local aid. In alphabetical order, the eight that appear more than once are

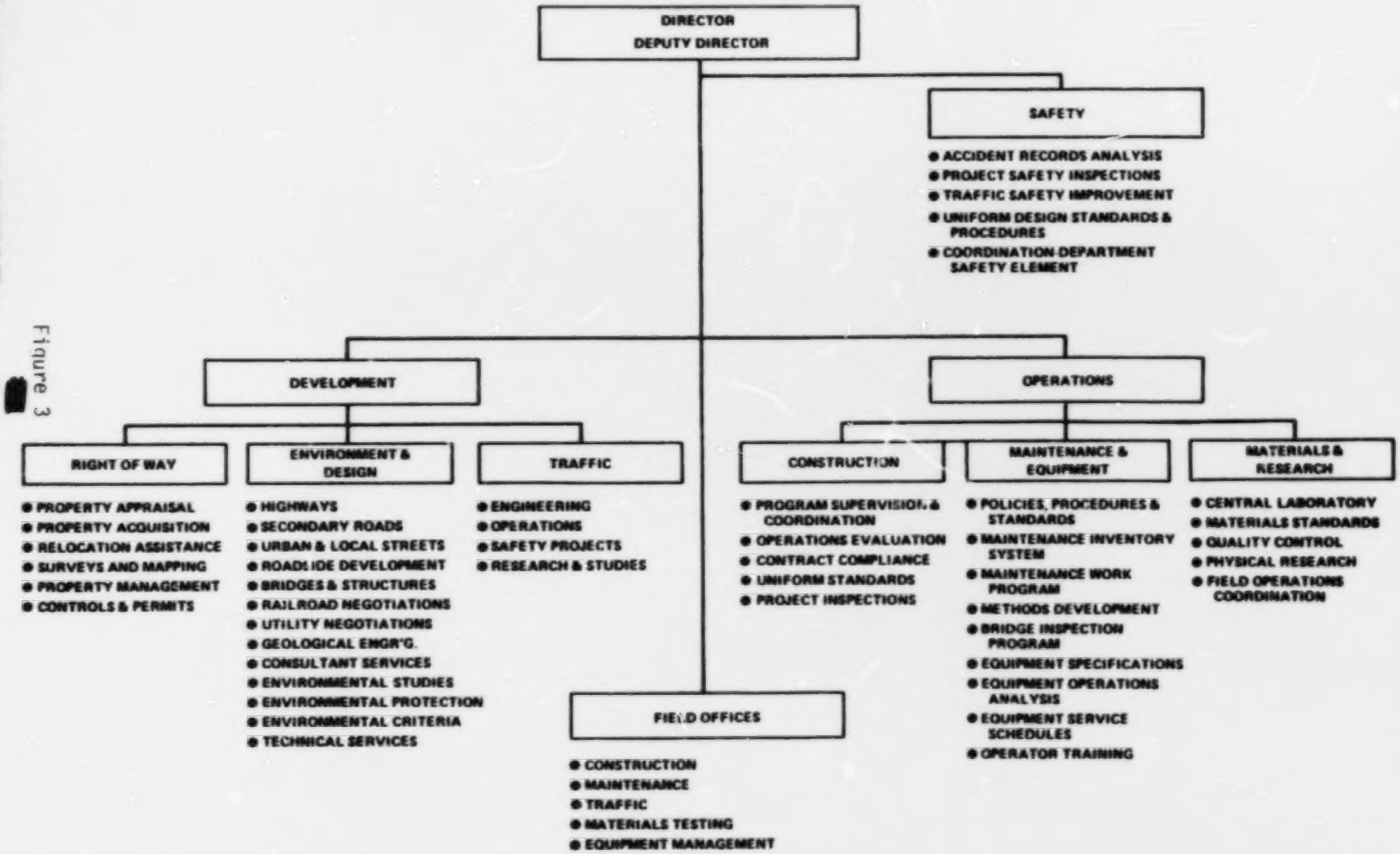
- Development
- Districts/Divisions (Field Offices)
- Engineering
- Maintenance
- Operations
- Right of Way
- Safety
- Secondary Roads

The titles and functions that appear most frequently and embrace the full scope of highway programs at the first level of organization are Development, Operations, Safety, and Districts/Divisions. As shown in figure 3, they become the major organizational elements in the typical (or composite) State highway agency. The analysis further indicates that subelements shown at the second level of organization, (i.e., Right of Way, Environment and Design, Construction, etc.) comprise those most frequently found at this level. No clear patterns emerge from the data on which combinations of functions comprise subelements at the third level of organization.

BEST DOCUMENT AVAILABLE

Figure 3

TYPICAL ORGANIZATIONAL STRUCTURE AND REPRESENTATIVE FUNCTIONS
OF HIGHWAY AGENCIES IN STATE DEPARTMENTS OF TRANSPORTATION



Management of Highway Programs

As noted, efforts to modernize management systems and procedures of highway organizations began in the early 1960's. The expanded scope and complexity of highway programs, introduction of multidisciplinary skills and evolution of more sophisticated management techniques also require expertise in management. State DOT's are improving their program administration to meet these new requirements.

It is becoming standard practice to document organizational policies in official manuals or orders. Typically, such documents set forth the principles of organization governing assignments of responsibility, delegations of authority, accountability for activities, organization structure and the procedures for effecting changes in the organization. They contain organization charts for the approved organizational elements, together with functional statements for each element. These documents establish the framework for conducting departmental operations and the means of administrative control. To develop performance criteria and standards and evaluate productivity and effectiveness, managers need the official statement of the organization's mission and functions.

Organizational and procedural services are an important addition to most State DOT's and highway departments. These services are provided by offices variously titled as Management Systems, Management and Operations, Systems and Procedures, Operations Analysis, or Systems Evaluation. Following are examples of the services performed in these offices:

- Maintain central control for policy, directive and procedure manuals and statements.

- Evaluate equipment proposals involving interdependent items in a production system.

- Research, evaluate, and recommend policy practices and control systems to improve operations.

- Provide internal management consulting services and perform management reviews.

- Maintain central control over all forms.

- Design information and control systems to include information required by top management.

- Conduct studies on the effectiveness of organizational arrangements, programs, systems and objectives.

The location of these staff services at high levels of the organization indicates the importance top management attaches to maintaining a strong capability for monitoring administrative operations.

Similarly, the introduction of automatic data processing (ADP) technology has had tremendous impact on highway program and administrative operations. Although in varying combinations of purposes and degrees, all of the States reviewed use ADP systems in their operations. The following sampling of applications indicates the wide range of ADP use.

Operations

- Highway and structures design
- Sufficiency ratings information
- Road inventory functional classifications
- Gasoline consumption forecasts
- Program development management
- Long and short-range needs planning studies
- Top management project status reports
- Manpower scheduling
- Bridge inventory and inspection schedules
- Railroad crossing data
- Highway mileage records
- Project schedules and status reports

Administration

- Accounting functions
- Fiscal studies
- Cash flow forecasting
- Annual capital budgets and quarterly reports
- Personnel management records and reports
- Budget operations and controls

Typically, ADP functions are located in a central office of administration to support the needs of all offices and for minimizing the duplication of facilities and effort. This centralization also promotes the use of ADP services for multiple, related purposes in the department.

The above indicators and the recent emphasis on training previously discussed provide clear evidence of the employment of modern techniques and processes to improve organizational efficiency.

CONCLUSION

Although each of the 52 States has a formal organization for highway program administration, there are many more differences than similarities among them in patterns of organizational structure. The differences reflect unique political traditions and institutions of State government and the widely disparate geographic and demographic characteristics of the States themselves. The requirements for comprehensive, multimodal program planning and development to meet all of the public transportation needs result in a different organizational arrangement in each State. On the other hand, generally accepted principles of administration and modern management techniques are employed in all State highway agencies.

As no two States have identical highway organizations and management processes, the "typical" highway agency is a composite of the organization and management features that predominate among these agencies. This is not to imply that the typical agency represents the most advanced state of the art in these respects. It merely indicates which organizational arrangements and processes are most favored.

Organization and management changes in State highway agencies have been occuring continually over the years. The accommodation of changing and expanding transportation needs and demands, more sophisticated and comprehensive planning and rapid technological advances in transportation have required commensurate organization and management adjustments. Further, the dynamics of social and economic change will continue to require appropriate updating of State highway agencies and the management technologies that are employed.

In addition, the evolution in recent decades of public concerns about the adverse impact of highway development upon the physical environment has vastly broadened the scope of planning processes and introduced the need for an interdisciplinary approach. Thus, it has been necessary to add specialists with expertise in many disciplines other than engineering to highway organizations. Modern State highway organizations employ economists, landscape architects, real estate appraisers, behavioral scientists, planning experts, management systems analysts, historians, and ecologists.

In the early 1960's, the concept of unified, multimodal State Departments of Transportation (DOT) began to emerge. At the present time, 42 States conduct their highway programs in this organizational context. Each of the 42 State DOT's is organized along the lines of either the modal, functional or mixed form of organizational structure (figure 1). In the modal organization, the modes incorporated into DOT have been left essentially intact, whereas, in the functional arrangement the identities of the individual modes disappear. That is, the modes are divided into individual activities, such as planning, program development, construction and administration. The third category, the mixed organization, contains characteristics of both the modal and functional categories. In these the "staff" functions of planning, and administration, and to a lesser extent others as well are consolidated for the provision of services on a department-wide basis (figure 2).

The expanded scope and complexity of highway programs, the introduction of multidisciplinary skills and the evolution of more sophisticated techniques in program and administrative management require specialized management expertise. As evidence of this, it is generally standard practice to document

organizational policies, functions and procedures in official manuals or orders. Further, staff offices for providing services related to organization, methods and procedures are established in most State DOT's. In addition, all of the States now use automated data processing technology to some extent in their program and administrative operations. Finally, resources and programs for training have expanded greatly.

There appears to be an almost infinite number of ways in which the functions and activities comprising highway programs can be organized and administered. Further, the differences in the motivations, styles and skills of leaders, the relative emphasis on training and staff development, and the subtle nature of interpersonal relationships in organizational settings influence the organization's effectiveness, no matter what the formal organization charts look like. The success of efforts to improve organizational performance will depend upon these human factors as well as the mechanics of formal structures and processes.

REFERENCES

America's Highways 1776-1976. Federal Highway Administration. U.S. Department of Transportation. 1976.

The American Association of State Highway and Transportation Officials. Organization Charts of State Highway and Transportation Departments, 1979.

Program Management Information System. Federal Highway Administration. U.S. Department of Transportation. Unpublished Computer Printout. 1978.

Haas. W.L.. Organization Planning and Management. Highway Research Board. Highway Research Record Number 69. pp. 18-34. 1963.

State Highway Department Management. Part 1 - Organization. Public Roads. February. 1970.

Current Organization Manuals. Transportation Departments in the States of California. Florida. Illinois. Iowa. Virginia.

State Highway Administrative Organizations. Highway Research Board. Special Report 51. 1959.

MANAGING FOR ACCOMPLISHMENT[1/]

Shortly after its creation in August 1975, the Kansas Department of Transportation (KDOT) embarked upon a comprehensive analysis and evaluation of its existing management and management information systems. The aim was to determine what, if any, changes should be made to enable KDOT to better cope with the many challenges confronting it and more effectively accomplish its mission as a multimodal State transportation agency.

A CONCEPTUAL MANAGEMENT SYSTEM FRAMEWORK

Early in the analysis/evaluation process, a basic philosophical and conceptual management framework was established for KDOT called Managing For Accomplishment (MFA).

While MFA is akin to the more widely known system of Management by Objectives, it goes beyond the latter in some respects. A major extension is the great emphasis placed on program management and accomplishment. The MFA is a systematic way of planning the management of an organization, public or private, and then managing that organization to accomplish its mission.

MFA incorporates the traditional management functions and activities of authority, and responsibility, accountability; planning, organizing, staffing, directing and controlling; and delegation and communications. It also includes such procedures and functions as performance appraisal, cost accounting, documentation, and wage and salary administration. It is essentially a system of arranging all these and other management activities into a more logical and effective pattern, so that all the managerial efforts are focused on accomplishment. While here the system is applied to a State transportation agency, the basic concepts and principles can be applied to any organization - large or small, public or private.

[1/] This section was edited from Part I of the report, "Resource Management System, Concepts and Principles," Draft, by O. D. Turner and Steve Caldwell, Kansas Department of Transportation, Topeka, Kansas, June 1977.

The MFA system has several foundation pillars:

1. The starting point for effective management performance in KDOT is the determination and clarification of "what is the 'business' of the organization?" or "why does KDOT exist?" The fundamental answer to these questions is "KDOT's 'business' is to provide adequate transportation service to the people of Kansas."

2. Once the basic "what is our business" question in answered, there must be definition and clarification of the basic mission - goals - policies - objectives of KDOT. This process culminates in a State Transportation Plan which is, in effect, the overall accomplishment objective of the department at any given point in time.

3. A hierarchical structure of goals/objectives is emphasized throughout KDOT. In this structure, managers of successively lower units in the organizational hierarchy regularly define and accomplish objectives which are consistent with and contribute to accomplishing the goals and objectives of higher units. These all focus on the State Transportation Plan (and the work programs defined in it) and ultimately on the KDOT mission.

4. There is constant encouragement of strong supportive relationships and actions among all units of the organization toward accomplishing goals and objectives.

5. There is high regard and concern for the individual person in the MFA system. Every effort is made to conceive and operate the system to integrate individual and KDOT goals and objectives. Fundamentally, the system conceives that jobs should be structured to increase to the maximum the abilities of KDOT's personnel to achieve personal goals and objectives meaningfully related to the performance of their work.

6. As wide participation as practicable and realistic in the decisionmaking processes is encouraged at all levels. This applies particularly to

deliberations in the planning and exploratory stages of major decisions. Once decisions are made, courses of action decided upon, etc., managers are expected to routinely make executory, or "carry out," decisions with a minimum of consultative or participatory actions.

7. The MFA system emphasizes the development of "carry out" plans and schedules for effecting decisions once they are made -- and adequate feedback information to responsible managers on progress. The basic action structure is: (a) a plan and schedule for accomplishment, (b) information feedback on actual accomplishment in relation to planned accomplishment, and (c) decisions designed to bring actual performance in line with planned performance.

8. The MFA system emphasizes "breakthrough" - a continuous effort to move to new and higher levels of performance and accomplishment.

THE MANAGING FOR ACCOMPLISHMENT IMPLEMENTATION STRUCTURE

It was recognized early that implementation of all the concepts/practices emphasized in the MFA system would require time - if for no other reason than that it is so comprehensive. It was further recognized that full implementation would require considerable change and modification to "put it all together" into a systematic, ongoing process encompassing all units of KDOT.

The greatest recognition was that there must be parallel and coordinated development of management capabilities in all key management activities in KDOT. Accordingly, there was developed a structure and definition of these key management activities to provide a framework for determining effective implementation steps.

Decisionmaking and Leadership. Management decisionmaking and leadership is the modus operandi by which members of management at all levels go about assembling and analyzing information needed to make decisions; defining alternatives and consequences; and actually making, communicating and implementing decisions to accomplish objectives.

Technical/Administrative Processes. The techincial/administrative processes of the Department are the system(s) of logic, organization, information flow, facilities, policies, and procedures by which KDOT details its programs and plans, manages its resources and resource conversion processes, and controls results. These processes largely establish the requirements to be met by the management information system and help define decisions and discussion alternatives.

Management Information System. This is the formal system for processing data which operates to collect, store, maintain, retrieve, process and deliver information needed by managers -- at all levels -- to make and implement decisions.

Communications. Effective operation of large, complex organizations, such as State transportation agencies, is necessarily dependent upon a continuous flow of relevant and meaningful information among all managerial, supervisory, and other employees. Emphasis in the management information system activity is on automated processing of relevant financial and operational data. Emphasis in the communication activity is on written and verbal communications among personnel. These kinds of communication augment those which result from operation of the management information system, and better communicate nuances which cannot generally be effectively communicated by automated data processing.

Manager/Employee Motivation and Development. This activity is the systematic administrative, educational, and practicable processes by which KDOT seeks to assure:

1. A continuous supply of capable persons in all key managerial and supervisory positions.

2. The continuous development of the capabilities of KDOT managerial and supervisory employees.

3. The structuring and restructuring of jobs to maximize the abilities of all personnel to achieve goals and objectives meaningfully related to performance of their work.

4. The integration of individual objectives and KDOT objectives.

These five key management activities are not independent and discrete, rather, they are closely related, interdependent, and, to some degree, overlapping. The MFA concepts/processes are interwoven into all components of the structure -- thus, tying them together and further assuring a means of coordinated evolution and development of an effective total management system for KDOT.

The Kansas Department of Transportation, like all State transportation organizations in this Nation, must operate in a constantly changing environment. It is generally accepted that the energy situation with which this country is confronted will, to some extent at least, affect the lifestyles of our citizens. The key characteristic of our society, in comparison to that of all other societies, is mobility. There appears to be no question but that mobility of both people and goods will probably be restricted to some degree -- unless we can develop additional sources of nonfossil energy.

There is little, if any, question that the U.S. transporation system is a key factor in the quality of life. And, it does not take a great deal of analysis to recognize that viability of our transportation system is, to a large degree, the responsibility of State transportation agencies such as KDOT. The essential nature of transportation, the looming scarcity of resources, and the necessity for increasing production and productivity, are the answers to the question of "why the MFA system?" The ultimate solution lies in the quality and effectiveness of transportation agency managers.

BLANK PAGE

DECISION MAKING SYSTEM[1/]

The Florida Department of Transportation (FDOT) is one of the first DOT's in the nation to develop and implement a top management decision-making process on a formal and systematic basis. For this reason it is appropriate to treat the general theory and operation of the system in some detail.

GENERAL BACKGROUND

During the past three decades there has been an increasing interest in planning in both private and governmental organizations. Much of this interest has centered on long-range planning. A major underlying cause of this is the accelerating pace of change in both the external and internal environments in which all organizations must operate and the attendant uncertainties which accompany such change.

As might be expected in any new and major development, planning practices have been subjected to continuing constructive analysis and criticism. One crticism has been the tendency to uncritically project present trends into the future on the implicit assumption that today's products, services, needs, markets, and technologies would be tomorrow's products, services, needs, markets, and technologies.

Another criticism has been that planners have tended to be so preoccupied with what should be done, they have not always directed sufficient attention to how it should be done. Too often plans have not resulted in action.

There has been increasing recognition of the impossibility of accurate forecasts or predictions, except over very short time spans. About all that can be done is to define a range of probabilities, but even these can be radically changed by actual events.

[1/] This section was edited from chapter 4 of the report Managing for Accomplishment and chapter 3 of the report Management by Objectives Implementation Program, Department of Transportation, State of Florida Tallahassee, Florida, July 1975 and 1973 respectively.

As the result of the continuing necessity for management to anticipate the future and to attempt to either shape it or adapt to it and the necessity for balancing short and long-range demands, there has emerged the concept that planning and decisionmaking must be integrated so that plans result in immediate work and commitments of resources. Drucker calls this strategic planning and/or decisionmaking and explains it as follows:[2/]

> Planning what is our business, planning what will it be, and planning what should it be have to be integrated. What is short range, and what is long range is then decided by the time span and futurity of the decision. Everything that is "planned" becomes immediate work and commitment. The skill we need is not long-range planning. It is strategic decisionmaking or perhaps strategic planning.

Drucker goes on to explain further the basic idea of strategic planning:[3/]

> Strategic Planning does not deal with future decisions. It deals with the futurity of present decisions. Decisions exist only in the present. The question that faces the strategic decision-maker is not what his organization should do tomorrow. It is, "what do we have to do today to be ready for an uncertain tomorrow?" The question is not what will happen in the future. It is, "what futurity do we have to build into our present thinking and doing, what time spans do we have to consider, and how do we use this information to make a rational decision now?"

In this emerging concept, strategic planning and decisionmaking are high priority top management responsibilities. It is from that level that overall direction of the organization must come. And it is at that level the overall control must be exercised--based on analysis of feedback information which shows actual results of decisions against planned or expected results.

[2/] Peter Drucker, Management, Harper & Row, New York, 1974, p.12.
[3/] Ibid., p. 123

MAJOR ELEMENTS OF THE TOP MANAGEMENT DECISION-MAKING SYSTEM

The FDOT's top management decisionmaking system is, in effect, a strategic planning and decisionmaking system. Its design and operation are based on the concepts described in the background section. Major elements of the system are described here.

The DOT Intent Structure

The necessary foundation for top management strategic planning and decision-making is the mission-role-goals-objectives intent structure shown in figure 1. Its purpose is that decisions result in actual work to accomplish the objectives derived from the mission-role-goals of FDOT. The important thing is that objectives be established and converted into action by specific assignments of work tasks, responsibility, and accountability for meeting these objectives. Unless this is done, goals and objectives are not of any particular use; they are only good intentions.

The Annual Work Plan

The basic modus operandi of the top management decisionmaking system has three steps:

1. A systematic process in which the Executive Committee makes appropriate top management decisions with the greatest possible knowledge of all pertinent information.

2. A continuous process of allocating resources necessary to make decisions and assigning responsibility for planning, scheduling, and implementing decisions.

3. A continuous process of systematically organizing feedback information and review and evaluation of actual results of decisions against planned results.

Fulfilling these processes requires procedures for assuring that all matters appropriate for top management's attention and action are brought before it in a

BEST DOCUMENT AVAILABLE

BASIC MISSION--GOALS--OBJECTIVES STRUCTURE AND DEFINITIONS

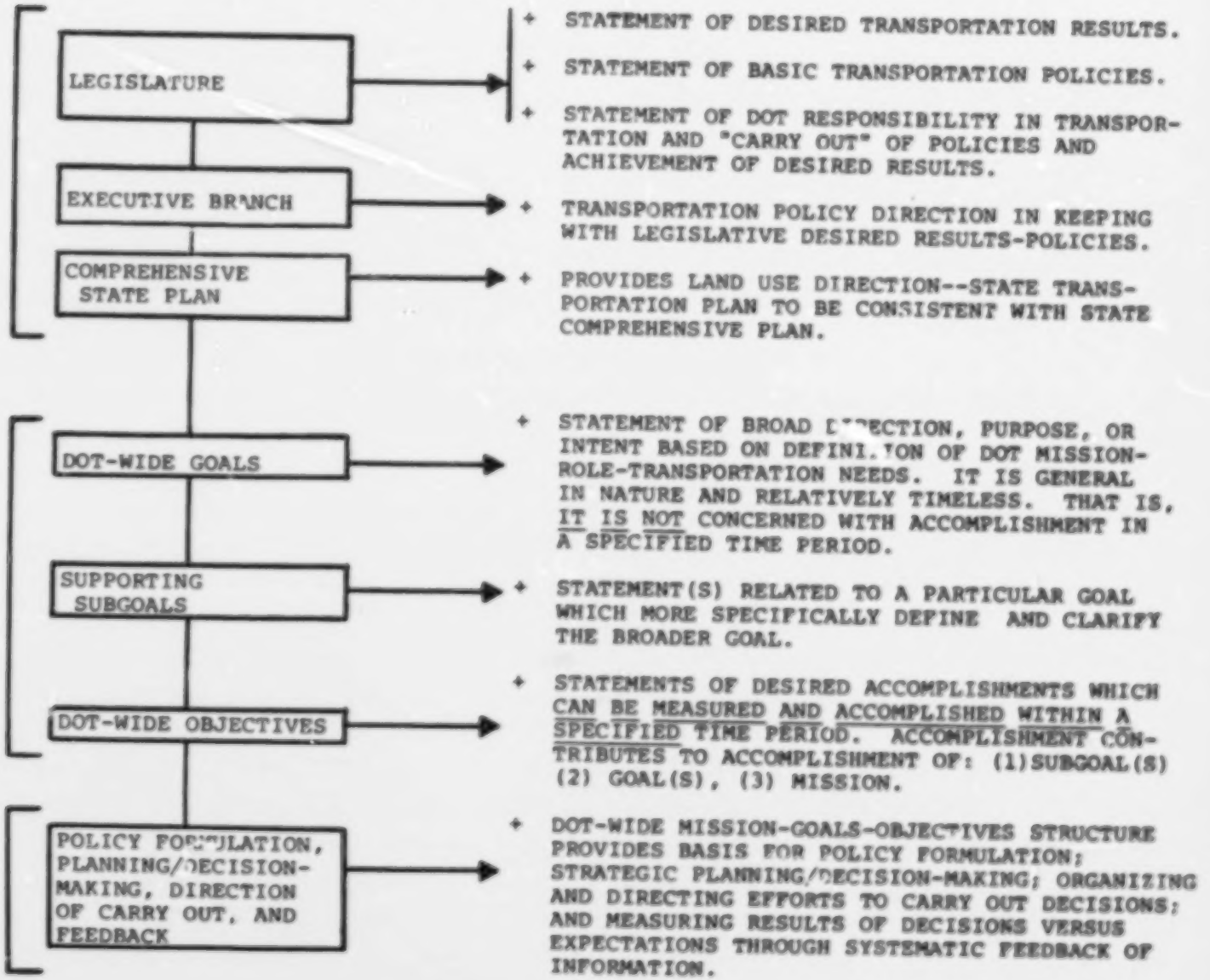

LEGISLATURE
EXECUTIVE BRANCH
COMPREHENSIVE STATE PLAN
DOT-WIDE GOALS
SUPPORTING SUBGOALS
DOT-WIDE OBJECTIVES
POLICY FORMULATION, PLANNING/DECISION-MAKING, DIRECTION OF CARRY OUT, AND FEEDBACK
BASES FOR DOT MISSION DEFINITION AND ROLE DEFINITION
GOALS-SUBGOALS-OBJECTIVES
IMPLEMENTATION OF DECISIONS/ PLANS
+ STATEMENT OF DESIRED TRANSPORTATION RESULTS.
+ STATEMENT OF BASIC TRANSPORTATION POLICIES.
+ STATEMENT OF DOT RESPONSIBILITY IN TRANSPORTATION AND "CARRY OUT" OF POLICIES AND ACHIEVEMENT OF DESIRED RESULTS.
+ TRANSPORTATION POLICY DIRECTION IN KEEPING WITH LEGISLATIVE DESIRED RESULTS-POLICIES.
+ PROVIDES LAND USE DIRECTION--STATE TRANSPORTATION PLAN TO BE CONSISTENT WITH STATE COMPREHENSIVE PLAN.
+ STATEMENT OF BROAD DIRECTION, PURPOSE, OR INTENT BASED ON DEFINITION OF DOT MISSION-ROLE-TRANSPORTATION NEEDS. IT IS GENERAL IN NATURE AND RELATIVELY TIMELESS. THAT IS, IT IS NOT CONCERNED WITH ACCOMPLISHMENT IN A SPECIFIED TIME PERIOD.
+ STATEMENT(S) RELATED TO A PARTICULAR GOAL WHICH MORE SPECIFICALLY DEFINE AND CLARIFY THE BROADER GOAL.
+ STATEMENTS OF DESIRED ACCOMPLISHMENTS WHICH CAN BE MEASURED AND ACCOMPLISHED WITHIN A SPECIFIED TIME PERIOD. ACCOMPLISHMENT CONTRIBUTES TO ACCOMPLISHMENT OF: (1)SUBGOAL(S) (2) GOAL(S), (3) MISSION.
+ DOT-WIDE MISSION-GOALS-OBJECTIVES STRUCTURE PROVIDES BASIS FOR POLICY FORMULATION; STRATEGIC PLANNING/DECISION-MAKING; ORGANIZING AND DIRECTING EFFORTS TO CARRY OUT DECISIONS; AND MEASURING RESULTS OF DECISIONS VERSUS EXPECTATIONS THROUGH SYSTEMATIC FEEDBACK OF INFORMATION.

Figure 1

systematic manner. A top management work plan is used to assure this. Two key elements in this plan are the annual work calendar and the process for presenting strategic issues to the Executive Committee.

The Annual Work Calender. The annual work calendar, shown in figure 2, contains key items related to program development, budget preparation and submission, and overall control. The basic idea is that there will be, at least, an analysis and consideration of each of the items in the direction-giving part of the calender each year and review and appraisal, as scheduled, of the control items.

The analysis of any particular item included in the annual calendar considers the existing goals and objectives and such questions as "what is the status?" and "what do we need to do to better accomplish our goals and objectives?" Such an analysis is designed to result in decisions that must be made and the actions necessary to carry out those decisions.

Presenting Strategic Issues. Figure 3 depicts the strategic planning and decisionmaking process as it evolved concurrently with the mission-role-goal-objectives intent structure shown in figure 1. Stragtegic planning is a process for selecting one broad course of action from among several alternatives as the best way to attain FDOT's major objectives -- with due regard for factors in FDOT's environment; current programs, strategies, and policies; resources available; and existing constraints (see table 1 for a more complete description). Five major elements comprise the combined process.

1. Environmental Assessment. The initial phase of the process is the continuing assessment/analysis of FDOT's external and internal environments in relation to existing goals and objectives. The assessment identifies and clarifies any factors that may affect definition or accomplishment of FDOT goals and objectives.

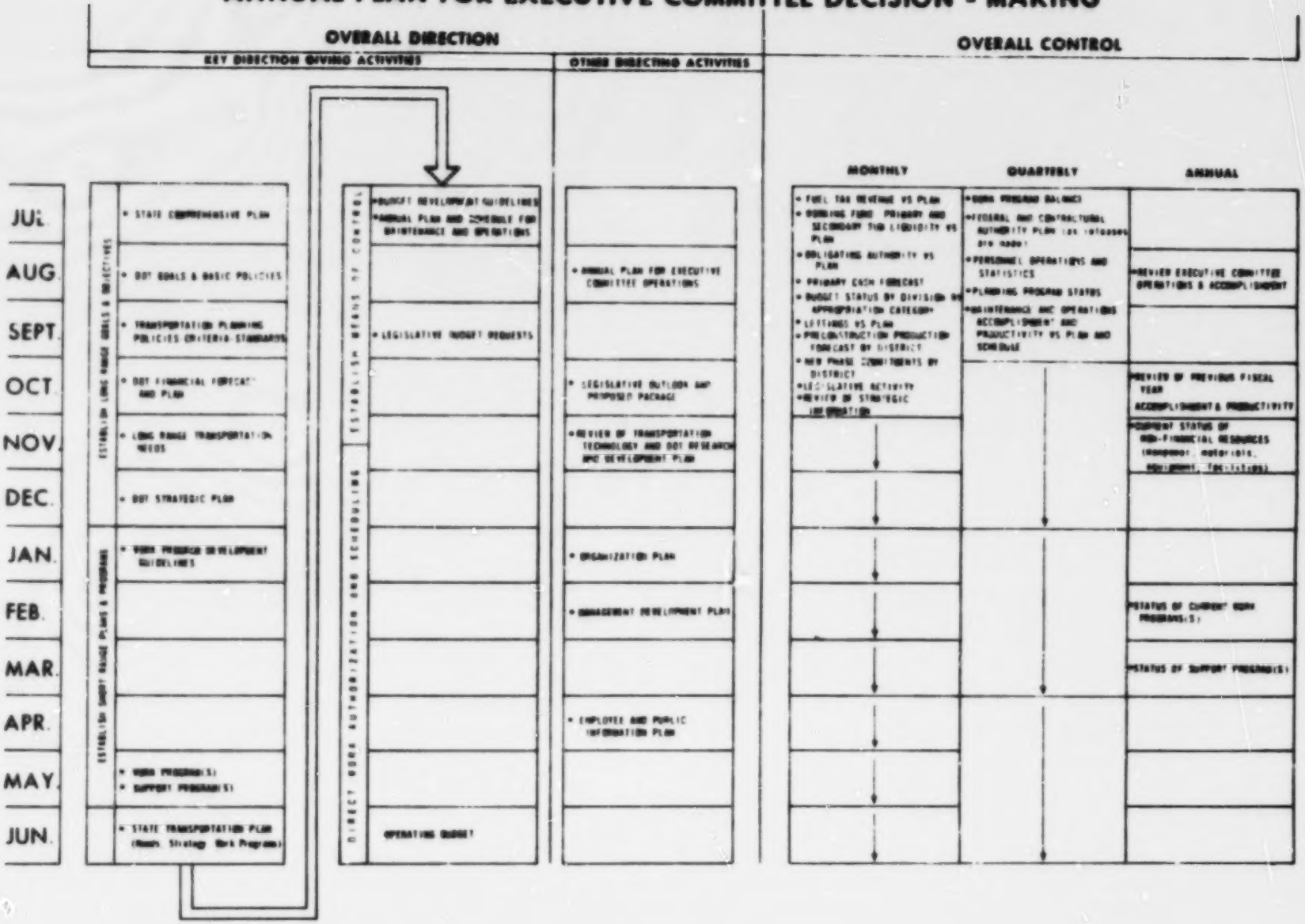
2. Definition of Strategic Issues. The desired result of the environmental assessment is the definition of any strategic issues which require decision. Issues are defined by asking, "what decisions must top management make now to accomplish its objectives and goals and fulfill its role in the future?"

BEST DOCUMENT AVAILABLE

Figure 2

FLORIDA DEPARTMENT OF TRANSPORTATION

ANNUAL PLAN FOR EXECUTIVE COMMITTEE DECISION - MAKING


OVERALL DIRECTION
KEY DIRECTION GIVING ACTIVITIES
OTHER DIRECTING ACTIVITIES
OVERALL CONTROL
MONTHLY
QUARTERLY
ANNUAL
JUL.
AUG.
SEPT.
OCT.
NOV.
DEC.
JAN.
FEB.
MAR.
APR.
MAY.
JUN.
ESTABLISH LONG RANGE GOALS & OBJECTIVES
ESTABLISH SHORT RANGE PLANS & PROGRAMS
ESTABLISH BASIS OF CONTROL
DIRECT WORK AUTHORIZATION AND SCHEDULING
• STATE COMPREHENSIVE PLAN
• DOT GOALS & BASIC POLICIES
• TRANSPORTATION PLANNING POLICIES CRITERIA STANDARDS
• DOT FINANCIAL FORECAST AND PLAN
• LONG RANGE TRANSPORTATION NEEDS
• DOT STRATEGIC PLAN
• WORK PROGRAM DEVELOPMENT GUIDELINES
• WORK PROGRAM(S)
• SUPPORT PROGRAM(S)
• STATE TRANSPORTATION PLAN (Goals, Strategy, Work Programs)
• BUDGET DEVELOPMENT GUIDELINES
• ANNUAL PLAN AND SCHEDULE FOR MAINTENANCE AND OPERATIONS
• LEGISLATIVE BUDGET REQUESTS
OPERATING BUDGET
• ANNUAL PLAN FOR EXECUTIVE COMMITTEE OPERATIONS
• LEGISLATIVE OUTLOOK AND PROPOSED PACKAGE
• REVIEW OF TRANSPORTATION TECHNOLOGY AND DOT RESEARCH AND DEVELOPMENT PLAN
• ORGANIZATION PLAN
• MANAGEMENT DEVELOPMENT PLAN
• EMPLOYEE AND PUBLIC INFORMATION PLAN
• FUEL TAX REVENUE VS PLAN
• WORKING FUND PRIMARY AND SECONDARY TSM LIQUIDITY VS PLAN
• OBLIGATING AUTHORITY VS PLAN
• PRIMARY CASH FORECAST
• BUDGET STATUS BY DIVISION BY APPROPRIATION CATEGORY
• LETTINGS VS PLAN
• PRECONSTRUCTION PRODUCTION FORECAST BY DISTRICT
• NEW PHASE COMMITMENTS BY DISTRICT
• LEGISLATIVE ACTIVITY
• REVIEW OF STRATEGIC INFORMATION
• WORK PROGRAM BALANCE
• FEDERAL AND CONTRACTUAL AUTHORITY PLAN (as released by OMB)
• PERSONNEL OPERATIONS AND STATISTICS
• PLANNING PROGRAM STATUS
• MAINTENANCE AND OPERATIONS ACCOMPLISHMENT AND PRODUCTIVITY VS PLAN AND SCHEDULE
REVIEW OF PREVIOUS FISCAL YEAR ACCOMPLISHMENT & PRODUCTIVITY
CURRENT STATUS OF NON-FINANCIAL RESOURCES (manpower, materials, equipment, facilities)
STATUS OF CURRENT WORK PROGRAM(S)
STATUS OF SUPPORT PROGRAM(S)
REVIEW EXECUTIVE COMMITTEE OPERATIONS & ACCOMPLISHMENT

THE STRATEGIC PLANNING/DECISION-MAKING PROCESS

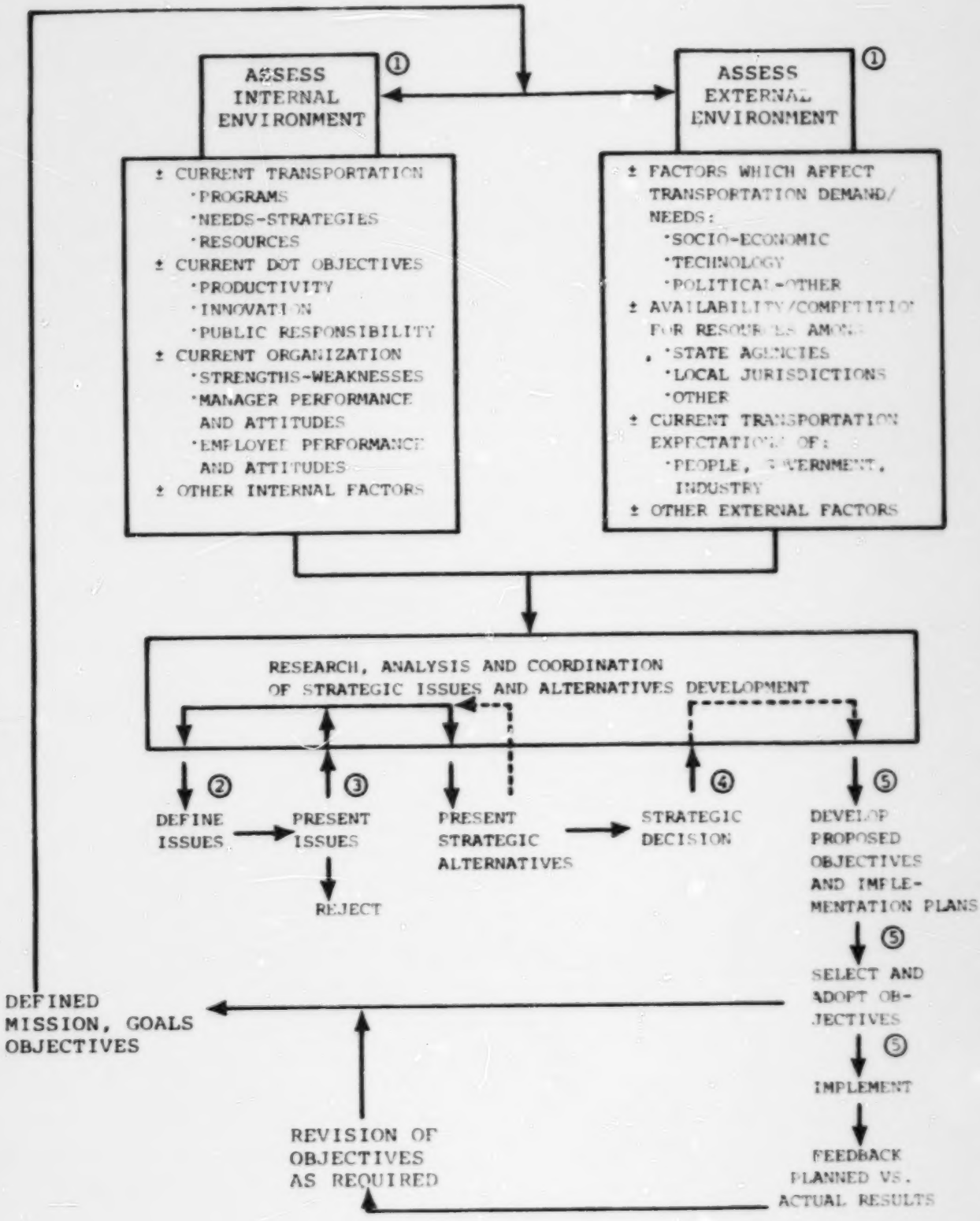


Figure 3

BEST DOCUMENT AVAILABLE

TABLE 1

FLORIDA DEPARTMENT OF TRANSPORTATION

STRATEGIC PLANNING

A. Definition

Strategic planning is the process of deciding on objectives of the organization, on changes in these objectives, on the resources used to attain these objectives, and on the policies that are to govern the acquisition, use and disposition of the resources.

B. Objective

The objective of strategic planning is to assure that DOT is in as favorable a position as possible to accomplish its mission.

C. Purpose

The purpose of strategic planning is to provide a basic management tool so that the quality of decision-making in DOT can be improved.

Strategic planning does not open the gates to a public administration utopia, nor does it contemplate the displacement of managerial imagination, judgment, or experience. The hard choices that are inevitably present in any effort to allocate scarce resources among competing claims will remain. Hopefully, they will be aided by a more appropriate and operationally meaningful organization of information on inputs and outputs, above all with information structured in relation to planning, decision-making and implementation.

It will insure much sounder judgment through more accurate information, pinpointing those things we ought to do more, spotlighting those things we ought to do less.

D. Process

Effective strategic planning requires the following kinds of actions/decisions:

1. Continuous monitoring and assessment of conditions/situations which may affect accomplishment of the DOT mission;
2. Definition of strategic alternatives which are available to best assure accomplishment of DOT objectives; and
3. Decision/adoption of best alternatives.

E. Responsibility

1. The responsibility for strategic decisions is that of top management (Secretary and Executive Committee).
2. Accomplishment of strategic planning is the responsibility of the individual members of the Executive Committee.
3. The Strategic Planning Unit reporting to the Secretary has the responsibility to assist and support top management and Division management at all levels in the accomplishment of strategic planning.

F. Supportive Role of Strategic Planning Unit

1. Establish and maintain DOT Strategic Information Bank on issues and factors affecting the strategic environment. This requires collection, assessment and analysis of information available within DOT organization units and sources outside DOT.
2. Dissemination of pertinent strategic environment information to top management and all levels of management in Divisions.
3. Establish policies and procedures for strategic planning throughout all DOT organization units. Policies and procedures to be approved and directed toward implementation by the Executive Committee.
4. Establish schedules for submission of strategic information and plans by Divisions and schedules for Executive Committee reviews, briefing and decision-making pertinent to Annual Plan. Schedules to be approved by Executive Committee.
5. Support coordination of strategic plans and planning activities.
6. Assist and counsel individual managers in developing strategic plans.
7. Develop criteria for evaluation and adoption of alternative strategic decisions by top management.
8. Prepare total DOT strategic plans through integration of Division and District plans.

G. Staffing of the Strategic Planning Unit

A relatively small staff will perform the supportive role of the Strategic Planning Unit. Specific staff positions and responsibilities will be announced in the near future.

BEST DOCUMENT AVAILABLE

3. Presentation of Issues. Once an issue is defined the procedure requires that it be presented to the Executive Committee. The Executive Committee may accept the issue, reject it outright, or request modification or additional information. If the proposed issue is accepted, the Executive Committee provides initial direction and assigns responsibility for performing staff work and developing a full presentation for decision at a scheduled time. The responsibility for developing the presentation varies, depending upon the nature of the issue and the units affected.

4. Decision. The presentation is to be made such that the Executive Committee may make a decision at the time of the presentation. This requires development of alternatives as well as the recommended decision by those responsible for the presentation.

5. Effecting Decisions. At the time the decision is made the Executive Committee provides initial direction and organization for carry out and allocates necessary resources. This includes assignment of responsibility for specific objectives development, implementation planning and carry out.

The Office of Strategic Planning has primary responsibility for the phases environmental assessment, definition of issues, and presentation of issues. During these phases, however, this unit coordinates with the functional units affected by the issues and decisions. Once an issue is accepted, the Executive Committee may assign responsibility for staff work and the presentation at its discretion.

Staff Work

Top management decisionmaking is done systematically within a schedule of recurring as well as nonrecurring decisions. Further, every effort is made to anticipate the future and to shape it to the degree possible and desirable to avoid a crisis decisionmaking posture.

Optimum operation of the system requires effective staff work with heavy involvement of key middle managers in the research, assessment, and analysis essential to effective decisionmaking. While these managers do not themselves make the decisions, their ideas are necessarily embodied in presentations and recommendations to the Executive Committee. The process holds great potential for channeling and incorporating the knowledge and ideas of middle managers into basic decisions related to FDOT's operations.

Figure 4 represents the general process for supporting top management decisionmaking. As shown, the Executive Committee gives initial direction and assigns responsibility for staff work and presentation of decisions. This applies to annual calendar items as well as strategic issues once they are accepted. Once this is done, the Executive Committee is again involved for the presentation and decision.

TOP MANAGEMENT--A TEAM JOB

The creation of the Executive Committee in 1972 recognized that effective performance of top management's tasks and responsibilities required a team approach to decisionmaking. The job is so large that it exceeds the capabilities of any one individual. The key idea is to increase the capability of the Secretary's office to more effectively handle the full range of its responsibilities, rather than to reduce the pressures on the Secretary by delegating his responsibilities and duties.

In matters before the Executive Committee, the members participate equally in discussions. Each member is expected to take an objective and department-wide viewpoint, not one oriented to his particular functional areas and responsibilities. Each member does, however, have final responsibility in his functional areas and has the final say subject to the concurrence of the secretary in related decisions. But other members are free to discuss, question, and make suggestions on any matter before the group.

The Secretary of Transportation as the group leader presides at meetings, sums up the discussions, and clarifies decisions. In addition, he is responsible and accountable by law for direction and operation of FDOT and has final responsibility for all major decisions.

GENERAL PROCESS FOR STAFF WORK TO SUPPORT TOP MANAGEMENT DECISION-MAKING

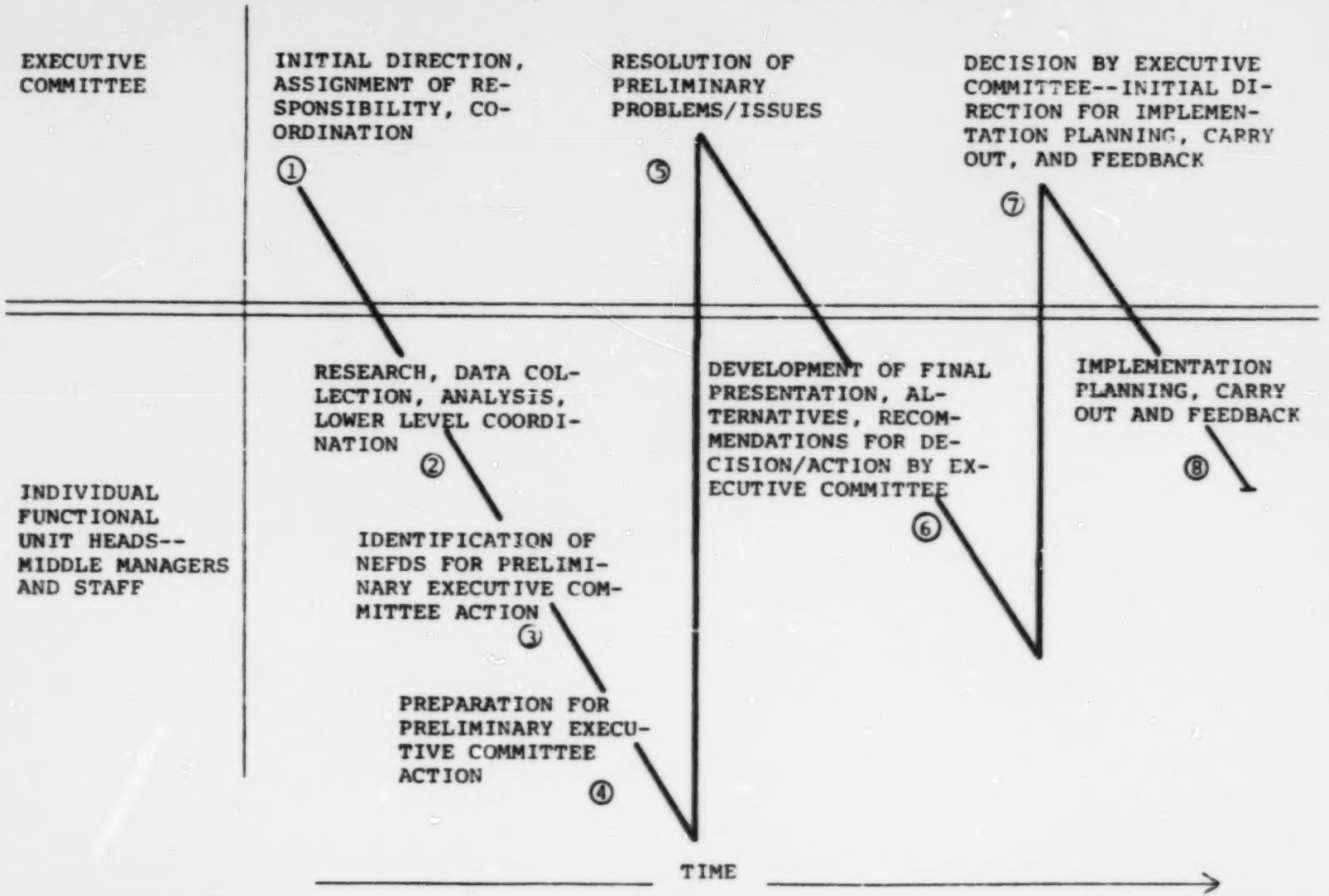

EXECUTIVE COMMITTEE
INITIAL DIRECTION, ASSIGNMENT OF RESPONSIBILITY, COORDINATION
①
RESOLUTION OF PRELIMINARY PROBLEMS/ISSUES
⑤
DECISION BY EXECUTIVE COMMITTEE--INITIAL DIRECTION FOR IMPLEMENTATION PLANNING, CARRY OUT, AND FEEDBACK
⑦
RESEARCH, DATA COLLECTION, ANALYSIS, LOWER LEVEL COORDINATION
②
DEVELOPMENT OF FINAL PRESENTATION, ALTERNATIVES, RECOMMENDATIONS FOR DECISION/ACTION BY EXECUTIVE COMMITTEE
⑥
IMPLEMENTATION PLANNING, CARRY OUT AND FEEDBACK
⑧
INDIVIDUAL FUNCTIONAL UNIT HEADS--MIDDLE MANAGERS AND STAFF
IDENTIFICATION OF NEFDS FOR PRELIMINARY EXECUTIVE COMMITTEE ACTION
③
PREPARATION FOR PRELIMINARY EXECUTIVE COMMITTEE ACTION
④
TIME

Figure 4

BEST DOCUMENT AVAILABLE

SCHEDULE AND AGENDA MANAGEMENT

As implementation of the decisionmaking system began, the need for effective management of the annual work plan schedule, meetings, and agendas became apparent for two reasons: (1) There was a tendency to place matters on agendas, which could be best handled at lower levels, and (2) There was a need for scheduling presentations and decisions arising from analysis and assessment of items on the annual calendar, as well as from the continuing definition of strategic issues. As might be expected, it became apparent that some of the latter directly related to one or more items on the annual calendar. When these are identified, efforts are made to schedule their consideration as close together as possible.

Rules and procedures drawn up for operation of the Executive Committee are:

1. Activities are scheduled for Executive Committee action. These include items on the annual calendar, strategic planning items, actions related to goals and objectives, resolution of short-range action and policy questions, informational and educational presentations, and planning of committee activities.

2. The rules provide that District Engineers, or their representatives, may attend any meeting. Normally, one meeting each month is planned around attendance of the District Engineers, the Florida Turnpike Engineer, and the Engineer of Materials and Research. Members of the general public may attend pursuant to Florida statutory provisions.

3. Additional meetings are held as required, particularly for major presentations related to annual work calendar items and/or strategic issues.

4. A 12-month schedule of meeting dates is prepared, subject to quarterly review by the Executive Committee. In conjunction with this there is a 12-month work plan which includes scheduled actions by the Executive Committee and assignments of specific dates where possible.

5. A detailed agenda is prepared for the forthcoming 2-month period.

6. All materials to be considered at scheduled meetings are distributed one week in advance of the meeting.

7. The minutes are distributed after each meeting.

CONCLUSION

The Strategic planning process has identified six key issues:

- A general cost improvement program
- Financial planning and control
- Unions
- Revenues
- Organization
- Transportation economics

A significant result of the team approach to top management decisionmaking has been an increase in the quality of communications and coordination among members of the Executive Committee. As one member expressed it, "The Executive Committee type of operation has caused a sharing of information among us and not just during meetings. It has extended to day-to-day operations." The latter is manifested by the fact that an increasing number of matters are handled by Executive Committee members working with each other without taking them up in regular meetings. All members have at one time or another expressed the opinion that the team type of operations has increased their knowledge and understanding of operations and problems of other functional units.

BLANK PAGE

PROGRAM DEVELOPMENT AND MANAGEMENT: PENNSYLVANIA'S INTEGRATED ORGANIZATIONAL APPROACH[1/]

In an era of severely limited resources, top level management must be intimately involved in the programing process. To be effective, in a management sense, the programing, budgeting and authorization process, must be closely integrated. This becomes even more critical as the Nation shifts from new highway construction to transportation system management.

In a bold organizational restructuring, the Pennsylvania Department of Transportation (PennDOT) shifted from its traditional allocation approach of transportation programing to an integrated organizational approach. This restructuring was accompanied by a parallel realinement of fiscal and systems management functions. Program priorities, as well as key programatic decisions, now are made through the Program Management Committee chaired by the Secretary and comprised of the Department's ten top managers. Programs are developed by the Center for Program Development and Management, which develops and presents options to the Program Management Committee. Fiscal implications are analyzed by the Center for Fiscal and Systems Management. The entire process is monitored and managed through computerized management information systems maintained through the Fiscal and Systems Management Center.

PENNSYLVANIA'S DEPARTMENT OF TRANSPORTATION

The PennDOT is an administrative arm of the Governor's Office. Its Secretary, who reports to the Governor, chairs the Pennsylvania Transportation Commission and serves on the Pennsylvania Turnpike Commission and in a variety of other capacities in addition to directing the Department. The Pennsylvania Transportation Commission is a 15-member body, which serves in an advisory capacity to the Governor, the General Assembly, and the Secretary. The Commission is comprised of leadership members from the General Assembly and public members nominated by the Governor and approved by the Senate.

[1/] This section was edited from the paper with the same title by Lee H. Bowser, Harvey Haack, and Thomas D. Larson, Pennsylvania Department of Transportation, July 1981.

Organizationally, PennDOT is divided into three administrative divisions (Safety, Local and Area Transportation, and Highways) and two staff offices (Planning and Administration). Other special functions such as the Press Secretary, the Inspector General, and the Chief Counsel report directly to the Secretary. The present organization of the department is shown in figure 1. It consists of 13,800 employes (down from 22,000 in 1970) and carries out its responsibilities within a total annual appropriation of approximately $600 million.

PennDOT's responsibilities are very diverse. These include operation and administration of 45,000 miles of highway and 27,000 bridges; operation and administration of five airports -- one of which is a major air carrier facility and another a major general aviation facility - and 50 miles of railroad lines, which it owns. In addition, PennDOT administers the licensing of vehicle operators as well as the licensing, registration, and inspection of vehicles. It also administers grant assistance programs for public transportation and for airport development. These diverse responsibilities translate into a multitude of programs ranging from capital development to operating assistance.

THE LEGAL FRAMEWORK FOR TRANSPORTATION PROGRAMMING

The Administrative Code of the Commonwealth requires PennDOT to recommend to the Pennsylvania Transportation Commission each even numbered year a 12-year program to be undertaken by the department. The code further requires PennDOT to review, revise, adjust, and add 2 years to the Commonwealth's transportation program taking into consideration the recommendations of the Commission and other relevant information.

The Administrative Code of the Commonwealth requires the Pennsylvania Transportation Commission to determine the highways, rapid transit, railroad, omnibus, marine, airport and other transportation facilities and services that should be constructed or reconstructed, and to recommend the order of priority. From time to time, the Commission's findings are to be certified to the Governor, General Assembly, and Secretary of Transportation for their consideration. In determining the recommended order of priority in which transportation facilities

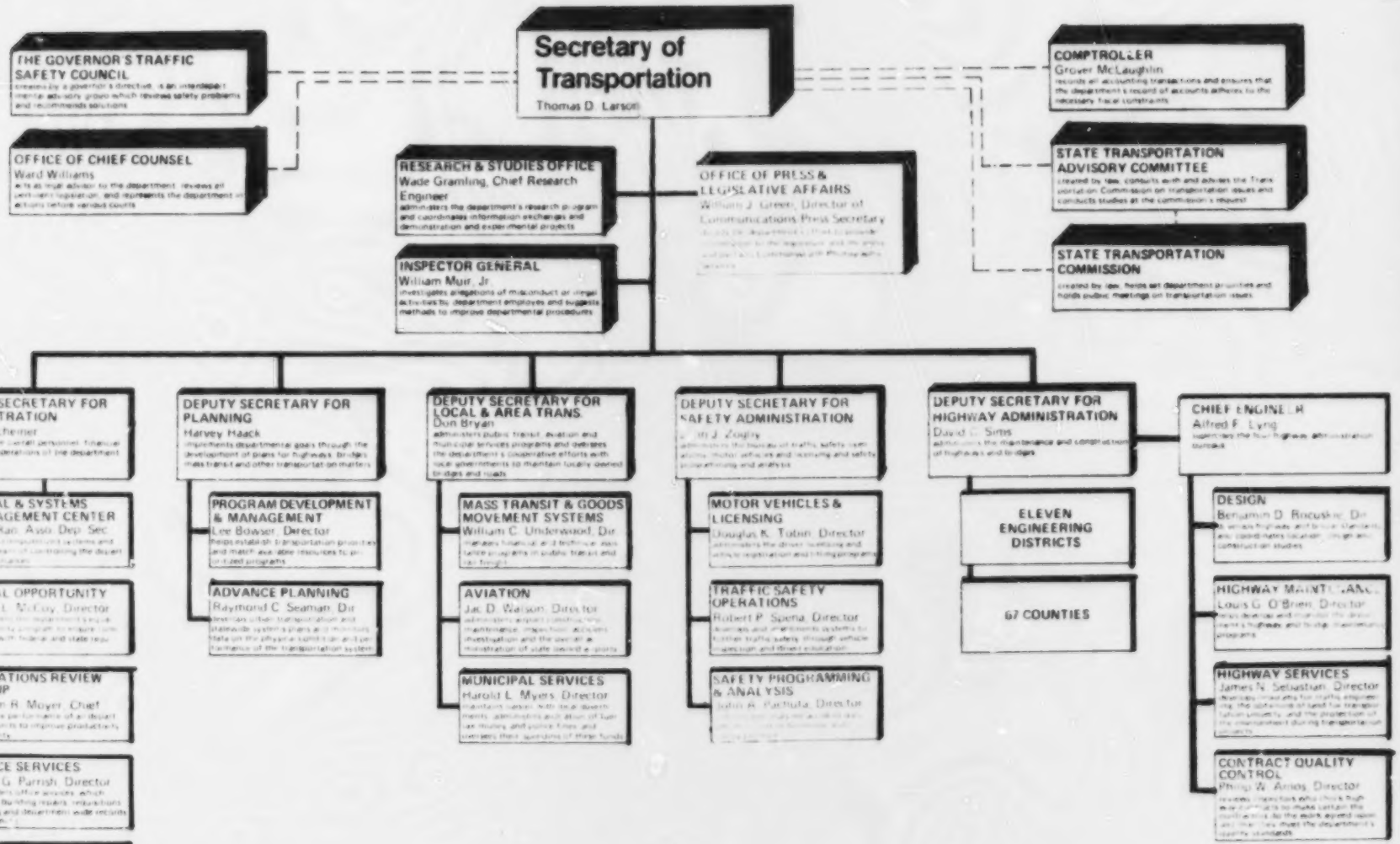


Figure 1

BEST DOCUMENT AVAILABLE

should be constructed or reconstructed, the Pennsylvania Transportation Commission takes into consideration the priorities established by PennDOT in its recommended Twelve-Year Program. However, the Commission is not bound by the department's program nor its priorities; nor is the department bound by the Commission's program or priorities.

The Constitution of the Commonwealth of Pennsylvania requires the Governor to submit to the General Assembly each year a capital budget for the ensuing fiscal year. The capital budget must set forth proposed expenditures to be financed from the proceeds of obligations of the Commonwealth, its agencies or authorities, or from proceeds of operating funds. The Governor is also required to submit a financial plan for not less than 5 years projecting expenditures for capital projects specifically itemized by purpose and by a proposed source of funds.

The General Assembly of the Commonwealth of Pennsylvania has the responsibility under the State's Constitution to appropriate funds for all payments out of the State treasury. The Constitution, likewise, requires the General Assembly to adopt a capital budget each fiscal year. Each phase of any project that is defined as a capital project requires the specific authorization of the Pennsylvania General Assembly.

While not specified in detail in current statutes, PennDOT is required to coordinate development of the Twelve-Year Program in cooperation with substate entities. In accordance with PennDOT's Action Plan,[2/] metropolitan planning organizations, regional planning agencies and county planning agencies, as well as interested Federal and State agencies, have the opportunity to participate in the development of PennDOT's Twelve-Year Program.

Federal legal and regulatory requirements impact program development and management as well. Several are of particular significance. Federal-aid projects in urbanized areas (more than 50,000 in population) are to be based on a continuing, comprehensive transportation planning process carried on cooperatively by the State and local communities.

[2/] A document that identifies the organization and procedures for considering a project's environmental effects in its development.

No project may be constructed unless the views of responsible public officials are considered with respect to the corridor, location and the design of the project. And more specifically, Federal-aid projects on the designated urban system are to be initiated by appropriate local officials with the concurrence of the State.

THE TRADITIONAL ALLOCATION APPROACH TO PROGRAMMING

Pennsylvania's traditional approach to transportation programming was primarily based on a county-by-county allocation of anticipated resources, which drove the capital program development process. Noncapital program development was scattered among various organizational units within PennDOT. Other than the 12-year forecast of available Federal-aid, there was almost a complete lack of financial planning.

Capital Program Development

Development of PennDOT's capital improvement program was coordinated through the former Bureau of Economic Research and Programming, however, decisions regarding priorities were, in general, external to PennDOT. The prevailing process, driven by the county-by-county allocation formula adopted by the Pennsylvania Transportation Commission, followed the highly structured process shown in figure 2.

Anticipated financial resources were allocated to the 67 counties according to the Commission's allocation formula. Within the 12-year county allocation, PennDOT's engineering districts and county planning agencies assigned preferred priorities to individual projects. After being ranked, projects were selected for the recommended program beginning with the highest priority and continuing until the respective county allocations were exhausted. The recommended program was subsequently presented to the Pennsylvania Transportation Commission, which ordinarily adopted the program as its own.

As long as resources were plentiful (or, at least seemingly so as with bond financing), this cooperative process insured local input. However, inflation significantly increased the costs of capital improvements during the same time

TWELVE-YEAR TRANSPORTATION PROGRAM: PRE-1979

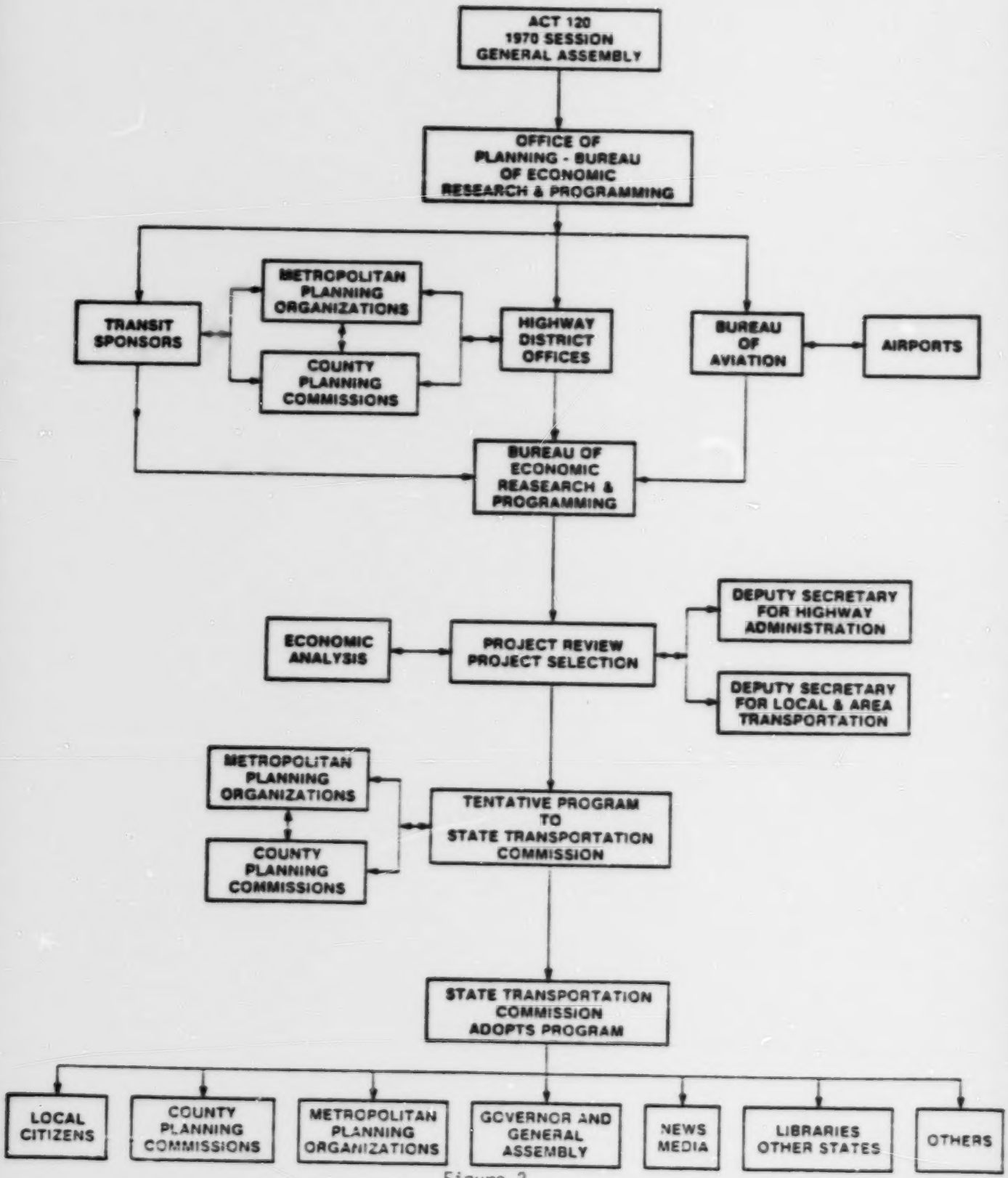


Figure 2

BEST DOCUMENT AVAILABLE

period when revenues were declining. At first, insufficient current revenues for capital financing was offset by bond financing, but eventually, all current resources were dedicated either to maintenance of the existing system or debt service on previously issued bonds for capital improvements. As the capital program became impossible to finance, it appeared that PennDOT was doing nothing even though it still collected a billion dollars from Pennsylvania taxpayers each year.

Noncapital Program Development

Noncapital programming was fragmented among various organizational units within PennDOT. Categorical programs initiated during the sixties and seventies (such as safety and critical bridge programs) were assigned to functional organization units. The nature of the organization was to institutionalize these assignments. Constituencies developed leading to a very parochial process even within the Department. This led to a variety of disjointed, narrow programs at the expense of the overall program structure.

Because of the fragmented approach to programing, information available to management was often inconsistent and not readily comparable between programs. Decisionmaking tradeoffs required by ever increasingly scarce resources simply could not be made. This denied top management the opportunity to assess competing requirements in any meaningful way. In addition, the fragmentated noncapital programs were less visible because of the relatively small dollar amounts involved with each when compared with the highly visible capital improvement program.

Financial Planning

In the early seventies, inflation not withstanding, PennDOT continued an ambitious program of highway construction financed largely through bond sales averaging $250 million a year and reaching a high of $440 million in 1976. By 1978, Pennsylvania's highway debt had increased to its current level of $2.2 billion -- twice as large as any other State in the Union. Bonds will not be fully retired until the year 2005, and through 1990, debt service will exceed $190 million per year.

The near absence of financial planning during this period had several programmatic effects. Financial constraints estimated for program development focused on total funds available during the 12-year period. Within the overall 12-year financial constraint, projects proceeded to implementation on a first-come, first-served basis. Shorter term program related financial issues were not addressed in any systematic fashion.

Fragmented Programs and Fiscal Chaos

In summary, the traditional, allocation approach to transportation programming failed to sufficiently link financial planning and management with program development and management. Pennsylvania's traditional concept of county-by-county resource allocation pre-empted the opportunity to address the Commonwealth's highest priorities on a systematic, statewide basis. Further, this multi-centered decisionmaking approach to programming, budgeting, and project authorization was often misunderstood and led to confusion within as well as outside the department.

By 1977, the lack of integrated financial planning and program development resulted in (1) the Commonwealth's loss of bonding capacity, (2) its inability to match Federal-aid, (3) the collapse of the highway programing process, and (4) a moratorium on construction. Literally dozens of modern, multilane, divided highways had been started all over the Commonwealth and were left partially completed -- leading to nowhere.

Understanding transportation programing under the fragmented, allocation approach helps to explain the mentality that continued (1) with big-ticket construction (using bond financing), while the existing highway and bridge system crumbled from age, weather, and overuse; (2) to rip-up basically good roadways in the name of safety and/or operational improvements, while adjacent roadways lay riddled with potholes; and (3) to finance improvements with 100 percent State funds (bond financed) when these same funds could have been highly leveraged with Federal-aid.

Top management's involvement in decisionmaking had become mired in bureaucracy. There had become a fixation with process -- especially with external coordination as a way of improving the process. This resulted in totally unrealistic programs which diverted attention away from real problems and decisions.

To be effective in today's rapidly changing and highly uncertain world, top management needed the opportunity to control resources and to make basic decisions concerning program direction. Until this restructuring was achieved, top management found it difficult to have any confidence in PennDOT's ability to deliver agreed upon projects.

AN INTERGRATED ORGANIZATIONAL APPROACH TO PROGRAMING

The new Administration responded to the unrealistic, fragmented programs and fiscal chaos by taking an intergrated organizational approach to programing. The first step was to develop a clear set of priorities as a framework for program development. Next, given the legal framework established by the Commonwealth's constitution and statutes as well as applicable Federal laws, the products of the programing process were defined. At the same time organizational and procedural frameworks were established to insure top management control over program and fiscal matters. Out of this evolved the Center for Program Development and Management for providing organizational structure and staff support for the integrated organizational approach.

Priority Framework

The priority framework for program development shifted emphasis from new construction to restoration of the existing transportation system. While this policy pervaded the Commonwealth's entire transportation program, the initial efforts were focused on restructuring the highway program. The Secretary established four groups of work activities (see figure 3).

First priority was given to routine maintenance including general maintenance, maintenance and upgrading of equipment, traffic services, winter maintenance, and roadside services.

PRIORITY PROGRAM GROUP

Group A - Routine Maintenance (including general maintenance, maintenance and upgrading of equipment, traffic services, winter maintenance and roadside services).

Group B - Improvements to the Existing Highway System

- Restoration Improvement on Roads
  - Interstate Restoration
  - Non-Interstate Federal-Aid Roads
  - Off Federal-Aid System Roads
- Restoration Improvement of Bridges
  - Federal-Aid System Bridges
  - Non-Federal-Aid System Bridges
- Bridge Replacements and Rehabilitation
  - Federal-aid System Bridges (State and Local)
  - Non-Federal-Aid System Bridges
- Operational and Safety Improvements
  - New Initiatives to Save Lives and Reduce Congestion
  - Transportation Systems Management Improvements

Group C - Interstate and Appalachian System Completions

Group D - Other Federal-Aid Completions

Figure 3

Second priority was given to improvements to the existing system. This group of projects included restoration improvements on roads and bridges, bridge replacements and rehabilitation, and operational improvements. Road improvements were grouped into subprograms according to whether the restoration project was on the Interstate Highway System, the non-Interstate Federal-aid systems, or whether the project was off any of the Federal-aid systems. Likewise bridge projects were broken into subprograms according to whether they were on or off any of the Federal-aid systems. Operational improvements were subdivided into (1) established safety improvements such as antiskid and spot safety improvements (high hazard locations and roadside obstacles) and (2) new initiatives to conserve energy, reduce congestion, and save lives.

The third priority was given to the highly leveraged Federal-aid completion programs including Interstate Highway completions leveraged nine to one for Federal dollars versus State dollars and the Appalachian Development Highway Program leveraged at four to one Federal dollars against State dollars.

Finally, last priority was given to other Federal-aid completions in the less leveraged primary, secondary, and urban systems programs. These programs only bring three Federal dollars for each one State (or local) dollar. Of particular concern was the primary program, which was four times over subscribed. For a decade, the Commonwealth had been financing Primary highway improvements with 100 percent State bond funds, but now, some 3 dozen primary highways remain to be completed at a cost in excess of $700 million (1981 dollars) and bond financing is no longer an option.

Organizational Framework

A program mangement capability was established to take advantage of the collective background and experience of the top management within PennDOT. A Program Management Committee was created consisting of the Secretary of Transportation as chairman, PennDOT's five Deputy Secretaries (for Planning, Administration, Highway Administration, Safety Administration, and local and Area Transportation) and the new Directors of Fiscal and Systems Management, Program Development and Management, and Communications.

Fiscal management and computerized information systems were pulled together into a Fiscal and System Management Center. In addition procedures under the control of this new center were either revised or newly instituted. Budget priorities and the budget structure were revised to enable immediate production of a transportation product with very limited resources. PennDOT's past bond financing approach was changed to cash financing. Cash-flow management techniques were instituted and, for the first time, cash flows were projected for 2 years in advance. Management information systems were also rationalized and instituted throughout the Department.

Program development and management activities were organized into a Program Development and Management Center. In its initial stages, the Program Development and Management concept actually functioned through an ad hoc task force comprised of those bureau and division level personnel then responsible for transportation programing. For the first time, the collective programming capability of PennDOT was brought together into one forum. The ad hoc committee dissolved, and the task of establishing a staff capability for the Program Center moved forward.

The Office of Press Secretary and Director of Communications was also established to coordinate all liaison with the media as well as with the members of the Pennsylvania General Assembly.

Procedural Framework

The program development process in Pennsylvania now consists of five distinct steps with respect to individual projects: (1) initiate, (2) review and rank, (3) select, (4) schedule, and (5) fiscal release. The five steps are assigned in stages and by organizational unit for highway program development. Program development other than highways --public transportation, airport development, and rail -- is in various phases of development. The identification of stages and the organizational assignments have defined responsibilities and decisionmaking points overcoming the previous confusion and misunderstanding.

Within the organizational framework, the Fiscal and Systems Management Center prepares multi-year accrual and cash flow projections showing estimated State financial resources available for transportation programs. Estimates, developed around high and low scenarios, are provided to the Program Development Management Center. The Fiscal and Systems Management Center also reviews and releases projects, phases of projects, or programs for formal authorization by the Program Management Committee.

The Center for Program Development and Management maintains distinct project assessment, program development, and program management capabilities. For the first time, an assessment of competing requirements and alternatives is taking place in a systematic fashion providing the foundation for developing program options. More importantly, the information is readily available to top management. The Program Center prepares and maintains multi-year Federal-aid forecasts, within which program development is constrained; and within which options for leveraging available State funds are developed. All program/project authorizations are now released through the Center.

Following certification by the Program Center, fiscal release by the Fiscal Center, and action by PennDOT's Program Management Committee, transportation programs, projects, or phases of projects are released to the appropriate operating division of PennDOT for implementation. Within these authorizations, any departure from established program schedules is immediately brought to the attention of the Program Center. Also, any departure from the approved scope of work or from the approved cost estimates by more than 15 percent or $500,000, whichever is smaller, must be brought to the attention of the Program Management Committee with written justification.

In the program development process, appropriately assigned organizational units may submit monthly revisions for the adopted transportation programs to the Program Center. These revisions follow procedures outlined within the appropriate modal priority program (highways, public transportation, and airport development). However, given the dynamics of this effort, week-to-week actions have actually been the case.

Within this framework, PennDOT (through the Program Center) initiates comprehensive reviews of the Commonwealth's 12-year programs for highways, public transportation and airport development during the even numbered years (as required by State statute). In turn, the Program Center reviews progress quarterly and reports it findings to the Pennsylvania Transportation Commission.

PennDOT has emphasized its intention to cooperate with county and regional planning organizations in its program development process. Given PennDOT's fundamental change in method for transportation programing, planning organizations to some extent felt threatened by the new approach. This is becoming less of a concern, however, as the department exhibits its ability to define the highest priority system deficiencies and take action to correct these deficiencies.

Center For Program Development And Management

The Program Center is the result of a significant restructuring within the Department of Transportation. The restructuring has consolidated construction and grant program development responsibilities rather than individuals from the operating divisions as transferring individuals was determined to be too disruptive. This has led to three divisions within the Program Center: (1) Project Assessment, (2) Program Development, and (3) Program Management. Figure 4 shows the general organization of the Program Center.

The Project Assessment Division consists of two key organizational functions, assessments and project inventory. While the objectives of these functional activities are many, the overriding objective is to provide the information and data base upon which program development activities can build. In many aspects, the Assessment Division is a reflection of PennDOT's past effort to coordinate its capital improvement program through the single central office unit. Building upon that concept, an evaluation capability has been added and the functional classification activities also have been assigned to this division.

The Program Development Division does not conform to the traditional staffing approach. The division consists of four key program managers with department-wide responsibilities, an assistant manager under each program manager, and a

CENTER FOR PROGRAM DEVELOPMENT AND MANAGEMENT

- ORGANIZATION -

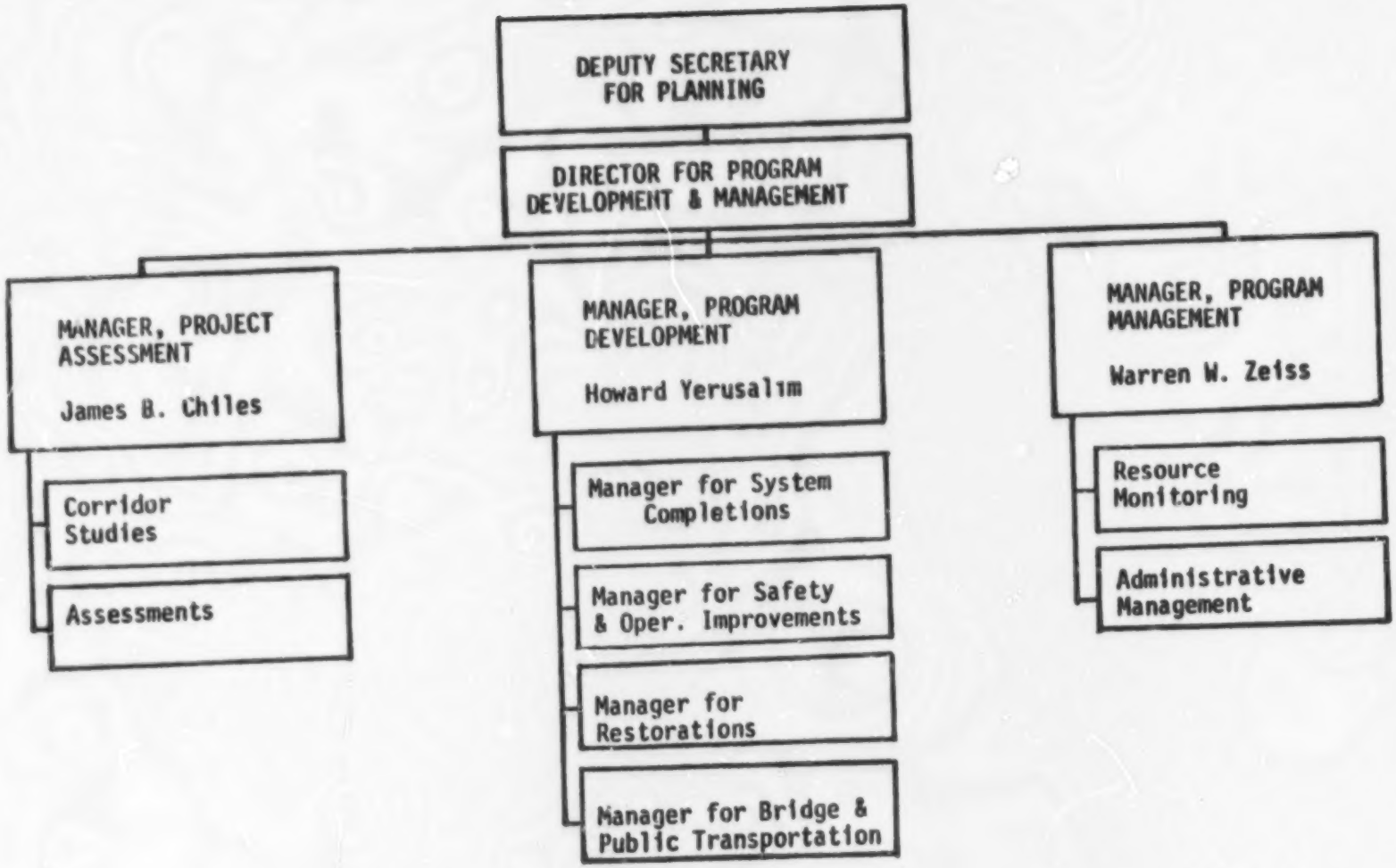


Figure 4

BEST DOCUMENT AVAILABLE

division manager. There is no other staff. Each program manager is responsible for one of four key priority program areas. A variety of individual programs fall within each of the four key priority groups as shown in figure 3. The manager for the Program Development Division is responsible for developing, preparing, and maintaining the department's overall construction and grants program.

The program manager's responsibilities cut across PennDOT, including its Engineering Districts and Central Office units. In addition to providing guidance and direction to PennDOT's District Engineers, Bureau Directors, and other metropolitan and area planning organizations, the program managers develop and recommend project evaluation criteria, methods of comparison and priority ranking tailored to the individual program requirements for which they are responsible. The managers also assist in developing procedures and guidelines based on top management objectives, and Federal and State laws, regulations and policies.

The Program Management Division consists of two organizational functions: Program and Resource Monitoring and Administrative Management. The program management division supports and monitors the construction and grants program. Program support revolves around the preparation and coordination of the variety of authorizations and information requirements which emanate from the legal, policy and organizational framework for transportation programing, budgeting and authorizations. The management function is the interface point within the department for the newly created project management system (PMS).

Products of the Priority Programming Process

The primary products of the integrated, organizational approach to transportation programing are 1, 4, and 12-year programs.

The 1-year program is a list of project phases by priority grouping expected to be active during the year. The list includes the schedule of lettings for specific projects moving to construction during the period. It also reflects PennDOT's planned Federal-aid obligations for the year. Within the year, a detailed reconcilation between project activities and the one year program occurs. The detailed reconciliation covers cost escalation within estimated cash available and required changes in project scope, costs, or scheduling. These changes may be

dictated as a result of project development or be deliberate decisions to downscope improvements to remain within limited financial resources. Detailed reconciliation of the one year program permits development of a firm letting schedule for public announcement at the beginning of each quarter.

The 4-year program is a list of project phases (by priority grouping) expected to be initiated and/or completed within 4 years. This program enables the department to concentrate its resources -- financial, human, and physical -- on meeting specific objectives. It details the list of project phases on which PennDOT managers are authorized to work. Compliance with these specific authorizations is insured through the interfacing of the computerized project management system and PennDOT's computerized accounting system. The Fiscal Center and the Program Center monitor department activities for compliance with these authorizations.

The Twelve-Year Program, required by State law is reviewed, revised, adjusted, and extended every 2 years to cover, in general, capital improvement projects. The review and revision effort is undertaken in cooperation with county and regional officials. Recommendations are focused through the Program and Management Center which initiates program development guidelines and criteria. The Center has, for the first time, developd alternate scenarios for the 12-year period, based on assumed alternate levels of Federal and State funding, and optional programs for consideration by county, regional, and State officials.

SUMMARY AND CONCLUSION

The key to successful program development in Pennsylvania has been PennDOT's ability to bring together programing and budget functions at the very top level of management. Information and monitoring systems have been instituted which allow top management not only to be involved in decisionmaking, but also to monitor implementation.

However, PennDOT's integrated, organizational approach still includes the active involvement of metropolitan and county planning organizations and continuous liaison with the General Assembly. The approach has enabled Pennsylvania to increase, within 20 months, the amount of Federal-aid obligated by ten-fold (to more than half a billion dollars), focus limited resources toward the restoration of its extensive existing highway system, and develop a program sensitive to local needs.

BLANK PAGE

MATRIX PROJECT MANAGEMENT IN TRANSPORTATION: NEW YORK STATE EXPERIENCE[1/]

Following a 1976 project management study, the New York State Department of Transportation (NYSDOT) formed a new group called the Program Planning and Management Bureau. This paper describes the matrix project management approach established for one unit of this bureau -- the Program-Project Management Section -- and the results achieved by the bureau in its first 2 years, 1977 and 1978. It is to be noted that this paper covers only the involvement with the highway program. The results were measured in reduced project slippage and the percentage relationship of dollar value of monitored projects let to contract to the dollar value of the total highway program let to contract.

MATRIX MANAGEMENT THEORY

To understand matrix project management, it is necessary to define a matrix organization. In a matrix organization, authority flows both horizontally and vertically. It includes key people, (program project managers) who have horizontal authority to cut across vertical lines of authority to advance a project. Matrix organization, as an advanced concept in organizational structure, is typically found in industries with complex technologies, especially the aerospace and computer industries.

Matrix project management is a form of management in which the actual work on a given project is performed in functional groups with vertical authority. But the flow of assigned programs and priority projects between these groups is overseen by a program project manager assigned to bring it to a successful completion. Although the program project manager has some formal authority, much of his or her success comes from the ability to influence functional managers and to reach an understanding with them. The effective program project manager exercises authority outside of that granted by the formal vertical organization.

[1/] This is an edited version of the paper with the same title by William J. McLoughin as published in Transportation Research Record 742, "Program Planning, Finance, and Preconstruction Management," Transportation Research Board, 1980.

The program project manager's responsibility is to ensure that the time, quality, and cost standards for the project are met. He or she expedites the project in each functional group. This is in contrast with a functional manager who is responsible for the project only while it is in his or her functional area but can not ensure that other managers involved with the project will also do so. The functional manager assigns staff and facilities and ensures that deadlines, technical accuracy, and other requirements within the functional area are met. Only recently have project managers of large organizations shifted their attention to the lateral relationships and the corresponding coordination and integration problems. Perhaps the reason for the rapid growth of matrix organizations is that managers are recognizing the need for more cooperation and coordination among groups.

TRANSPORTATION PROJECTS AND MATRIX PROJECT MANAGEMENT

Under matrix management the program project manager's principle objective is to reduce time delay and the associated cost due to inflation. The time required to develop a transportation project varies considerably by the type of project. Planning and designing a new facility may take many years, but resurfacing an existing highway may take only a few months.

Every project results in social, environmental, and economic effects that must be assessed in the development process. To ensure that such effects are consistently and systematically considered, each State has been required to develop an environmental action plan, a format document that defines the organizational framework for considering these effects throughout the project development process. Further, to comply with the provisions of the National Environmental Policy Act (NEPA), the environmental impacts of each individual project must be assessed so that final project decisions are made in the best overall public interest. The complexity of these Federal environmental compliance procedures (including a multiplicity of reviews), and the added State and local requirements have caused lenghty delays and added costs to projects.

At the average inflation rate of 9 percent of the early seventies, the average increase of project development time (44 months)[2/] meant increases in the costs of projects of more than 30 percent. These increased costs became a matter of great concern to the States as highway costs escalated. This has been particularly a concern to those States that dedicate their highway user revenues, since available tax dollars declined due to lower fuel consumption.

The complexity of the project development process found in the environmental action plan and the need for detailed coordination among the various functional areas made it difficult for functional managers to keep projects on schedule. This made it apparent that changes in the management system were necessary, which led to consideration of matrix project management. The following are four guidelines in considering a matrix approach: (1) A time schedule must be met, (2) cost constraints are critical, (3) coordination of specialized skills is required for completion of the project, and (4) the required actions are in some way new or unfamiliar to the personnel involved. More important factors in the highway project development process are: (1) more than one organizational entity is responsible for various aspects of the process, and (2) the number of projects is so great that top management cannot personally oversee the project process.

Thus, NYSDOT management decided to establish a management mode based on matrix project management for two reasons: (1) The process through which a project must proceed is time consuming and requires the interactions of many functional groups, and (2) the large number of projects makes it impossible to have one project manager assigned to each project or a limited number of projects.

MATRIX PROJECT MANAGEMENT IN NYSDOT

Organization

In the fall of 1976, in an effort to implement maxtrix project management, four

[2/] United States Senate, "Proposed 1972 Highway Legislation," Hearing Before the Subcommittee on Roads of the Committee on Public Works, 92 Congress, May 10-26, 1972, pages 179-80.

sections (1) The Program Planning Section--previously located in the Planning Division, (2) The Capital Projects Coordination Bureau--previously located in the Finance Division, (3) The Environmental Analysis Section--previously located in the Development Division, and (4) The Program-Project Management Section--newly created, were centralized in the Program Planning and Management Bureau. This staff organization was established to reduce the number of lost project lettings and limit the impacts of outside changes on the delivery of an overall annual program and to provide a bridge for the functional groups when new or significantly different programs are introduced. This new group brought together three existing functions having department-wide responsbility for project advancement and created a small group of problem solvers to assist in advancing programs and high priority projects. This new organizational structure locates primary units that interact during critical stages of the project development process within the same major group. This provides shorter, simplified lines of communication between the units involved. The new unit in this group, the Program-Project Management Section, oversees critical projects.

As this group reports directly to the Office of the Commissioner, the following benefits can be anticipated:

1. It provides a focal point for the early detection and prompt resolution of potentially significant problems.
2. Better and more current information on the status of programs and projects and the impacts of various options are available to the executive staff.
3. Quicker actions and decisions on new programs are possible.
4. Department resources are used more efficiently.
5. The time needed to bring a project to completion is decreased.
6. It integrates programing and scheduling factors.

The Program-Project Management Section implements the matrix management concepts and is responsible for obtaining the management decisions necessary to complete programs and related projects on schedule and within budgeted costs. It consists of a small group of problem solvers each of whom is responsible for

advancing programs and high priority projects. The section leader, the Chief Program Project Manager, assigns project and program duties to the four project managers and represents the section at staff meetings. The Principal Program Project Managers handle larger and more complicated projects and program areas. They also act in a supervisory capacity to the Associate Program Project Managers.

The duties of the program project managers in this system can be broken down into several major areas, the most comprehensive of which is to manage the flow of assigned programs and priority projects among functional areas and bring them to a successful conclusion. In accomplishing this, the program project manager directs the overall implementation efforts including the preparation and revision of program plans, schedules, and necessary instructional materials and provides clarification where necessary. Other duties include establishing and maintaining liaison with other State and Federal agencies on identified critical or delayed projects, performing continual review of assigned projects to ensure that schedules are being met, resolving issues and problems beyond the scope of the functional managers (which includes identifying problem areas), and recommending to the functional managers remedial courses of action. It should be emphasized that the program project managers are not responsible for substantive aspects of the programs or projects and therefore are not substitutes for the functional managers, who have the responsibility for controlling activities and the performance of work.

Operation

Currently, NYSDOT must coordinate more than 30 programs, such as Interstate, consolidated primary, urban system, hazard elimination, Appalachian development, and emergency relief. These are constantly in flux as programs are added, combined, or eliminated. The Program-Project Management Section assists the functional managers in coping with these changes and in enlisting the timely support of others whose actions are critical to advancing the programs. Program project managers should have full knowledge of all aspects and requirements of programs and assigned projects and serve as a bridge across functional lines. For new or significantly changed programs, the program project manager ensures that responsibility is assigned, that all involved parties are informed, that staffing plans are prepared, that design plans are advanced, and that proper priorities are

assigned to ensure program progress in accord with top management's decisions. Once a program is running smoothly, program project management personnel will withdraw and rely on the basic monitoring system to identify new problems.

There are also a relatively small number of projects that require individual and concentrated attention to bring them to completion. These include projects in which there is a great deal of public interest as well as those that are particularly complex or critical, or have lost considerable time due to coordination problems.

In addition, the program project managers are assigned projects that have routinely fallen behind schedule, as reported by the Capital Projects Coordination Bureau, which is responsible for the project management information system. Each year an estimated 100 projects receive this detailed review. For these, the program project managers seek to uncover problems that may be caused by lack of policy, misunderstanding of policy, delays in decision-making, or insufficient coordination across functional lines and bring these to the attention of the appropriate functional manager. They also ensure that higher-level mangement is informed of delays that are beyond the control of department personnel so that administrative action can be taken.

RESULTS: 1977-1978

Two measures were used in evaluating the first two years of operation of the program: (1) the extent of project slippage (2) and the percentage relationship of the dollar value of monitored projects let to the dollar value of the total highway program let. These measures were chosen because they are measures of the success in meeting the goals and objectives for NYSDOT and because the required data are easily obtained. Those projects identified for detailed monitoring were those that had engendered a great deal of public interest and also those that had fallen behind schedule and had not been returned routinely to schedule by the responsible functional managers.

In 1977, some 100 projects were monitored in detail and, in 1978, 116 projects were monitored in the same way. The 100 projects monitored during 1977 had a high percentage of projects in the later stages of project development. The 116 project

monitored during 1978 were more representative of projects in the development process. Sixty of the projects monitored in 1977 were let in that year, and 31 of the projects monitored in 1978 were let in that year. The average construction cost estimate of the projects being monitored was in excess of $10 million. During the 2 years, the 91 monitored and let projects, although representing only 14 percent of the projects included in NYSDOT's highway letting program, composed 68 percent of the total dollar value of the program. Thus, the Program-Project Management Section was monitoring the larger, more complex projects.

A major factor in the success of matrix project management is its effectiveness in holding projects within time constraints. The analysis of the average slippage or schedule delay is based on the 2-year period, January 1975 to December 1976. Typically during this period project schedules were slipping 5.11 months. In one regional office 12 projects slipped 10.33 months. During the period January 1977 to December 1978, projects that were closely monitored slipped only 2.45 months on the average, a reduction of 53 percent. If this slippage reduction is applied along with an average inflation rate of 10 percent per year for the 2-year period to the total letting ($1364 million) of highway projects monitored by the Program-Project Management Section for the same period, the cost saving is $30 million.

Another indicator of success is the support of top management for the efforts of the Program-Project Management Section. Monthly status reports on the monitored projects are developed by the section and reviewed at regular monthly meetings with top management. At these meetings, decisions are made on those problems beyond the control of the functional manager and action is taken to correct the situation. Although many other factors are involved in the measured success, without this visible follow-up to major delays, it is doubtful that the section would have achieved such results in the first two years.

FUTURE YEARS

The future of matrix project management depends on the recognition of its possible failings. These are: (1) its inability to identify the responsible person; (2) the fostering of power struggles; (3) being considered redundant during economic

recession; and (4) fear of high administrative costs associated with the matrix organization. Dealing with these and other problems associated with the matrix approach can improve the group's chance of future success. Continuing on course without acknowledging some of the possible failings of the matrix organization would be shortsighted.

Over the past 2 years, the major area of concentration of the Program-Project Management Section has been on the highway mode; there has been only minor emphasis on other modes of transportation. From projected trends, however, it it apparent that, in the future, more of the section's activity will involve programs for other transportation modes.

CONSIDERATIONS IN ORGANIZING STATE TRANSPORTATION AGENCIES[1/]

INTRODUCTION

Many dimensions should be considered when organizing or reorganizing a State transportation agency. Among these are:

- Modal integration versus funding mechanisms
- Policy body structure
- Modal versus functional structure
- Delegation of authority

Management in restructuring its organization may have broad or narrow latitude in any one of these dimensions, depending on the specificity of authorizing legislative and executive policy and direction.

MODAL INTEGRATION VERSUS FUNDING MECHANISMS

The most fundamental consideration in organizing a multimodal transportation agency is the tradeoff between integrating the constituent modes and reflecting in the organization funding mechanisms which support the overall transportation program. Of course, this consideration would disappear if all funds available for the various modes were consolidated into one transportation fund.

The primary intent for organizing State departments of transportation was to integrate the modal transportation systems into a single, more effecient one. The fact that funding remains available by modes and by categorical programs within modes has worked against this intent. Projects are identified for programing and programed based on the categories of funds available. Consequently the planning, design, and construction activities also are influenced heavily by the categories of funds available and not enough by the agency's basic objectives and identified transportation needs.

[1/] This paper was written for this report by Edward N. Kashube and Philip W. Blow, Federal Highway Adminstration, U.S. Department of Transportation, 1981.

POLICY BODY STRUCTURE

Twenty years ago a special report of the Highway Research Board[2/] discussed the advantages and disadvantages of various administrative arrangements in highway agencies. With only slight modification, these points are valid for State DOT's.

An organization reporting to a single executive is supported by two arguments: "The first is that a department is primarily an administrative agency, and therefore is most effective when the power to make decisions is reposed in one person rather than in a multi-member body which must consume time in effecting a meeting of the minds. The second is that a single-executive department with the executive appointed by the governor is responsive to changes in public opinion. Because the governor in this situation has ultimate responsibility for the proper administration of the department, he will insure that it is functioning as the public desires. At the same time, he can make certain that the work of the department"[3/] is properly coordinated with other State agencies.

The disadvantages of the single executive are that judgments may not be as balanced as those by a commission, e.g., deciding which policies are in the greatest public interest. "Also, in some States having single-executive departments, the department head may change every time a new governor takes office, or at least with every major political change. This practice is not confined to States having the single-executive form of organization, however. It also prevails in many States having commissions, including a number of those in which commission members are supposed to serve staggered terms. Although inability to change department heads has thwarted political manipulation of departments by some governors, it has doubtless been equally effective in frustrating the efforts of others to put desirable policies into effect."[4/]

[2/] Cavanagh, J. E., Haas, W. L., Lewis, R. S., Rehberger, E. H., and Famous, P., State Highway Administrative Organizations, An Analysis, Special Report 51, Highway Research Board, 1959.

[3/] Op. cit., page 13.

[4/] Op. cit., page 14.

Using advisory commissions in conjunction with the single executive has no serious disadvantages if the commission remains truly advisory in nature. It affords the executive. "...the benefit of the practical experience and advice of a body of people who, in the ideal situation, will be fully familiar with the needs of the State. Furthermore, advisory bodies are in keeping with a strong tradition of citizen participation in the affairs of government."

"There are, however, a number of dangers attendant on this arrangement... The commission ... may not be content with offering advice, which may or may not be taken, and interference with the administration of the department may result. Even if the commission does not of its own volition assume unwarranted powers, the legislature, having created it, may subsequently vest it with powers not congruous with its intended function."

"Another possible danger with advisory commissions is at the opposite end of the scale. Since they are limited to giving advice, members may lose interest, with the result that the body lapses into inactivity and becomes a useless appendage."

"The problem with this type of organization, then, appears to be one of maintaining balance, of utilizing the services of the board sufficiently that members will maintain an informed interest in "...transportation..." needs without at the same time allowing them to encroach on departmental administration."[5/]

In choosing between the single executive or administration by a commission, it could be assumed that combining the two concepts will lead to the ideal situation. For this to work, the functions of the single executive must be clearly separated from the functions of the commission. As pointed out in Special Report 51, this is very difficult to achieve. If the commission may formulate general policies, then it follows that it may see that the executive implements the policies. The executive then becomes subordinate to the commission. Another difficulty with the dual arrangement is that it may diffuse responsibilities. Any duty not clearly stated in the legislation creating the organization will then become everybody's duty or alternately no one's duty.[6/]

[5/] Ibid.
[6/] Op. cit., pages 14-15

A limited-control commission is essentially a policymaking body with few administrative responsibilities. An executive officer is responsbile for the day-to-day administration of the department. Theoretically, the commission provides a resource of varied experiences in transportation management and problem solving.

While this experience may be useful in policy development, it may not outweigh the difficulties the administrative executive may have in getting a rapid response on how policies should be applied in the daily operation of the agency.

Some argue that a limited-control commission protects the department from interference by the governor. Yet, on the other hand, a department should not be so protected that it is impervious to any of the governor's administrative policies. This issue is particularly significant when the governor has a mandate from the electorate to carry out a particular policy.[7/]

The administrative commission goes beyond the limited-control commission form, in that it is extensively involved in the daily operation of the department. Its major drawback is that it is not as efficient as the single executive, because major decisions must be acted on by the whole commission membership and thus delay decisionmaking.[8/]

The following guidelines were suggested in special report 51 by the Highway Research Board on whether or not to have an administrative board. A board is recommended if there are irreconcilable community opinions on activity, when specialized technology is employed, when deliberation on policy is required, or when there are quasi-legislative or quasi-judicial problems. A single-executive form is favored when quick action or decisions are needed, when technology is well understood, when organizational discipline is required, or when activities are well established or routine.[9/]

[7/] Op. cit., pages 15-16
[8/] Op. cit., pages 16-17
[9/] Op. cit., pages 18

MODAL VERSUS FUNCTIONAL STRUCTURE

Modal versus functional organizational structure is described in the Lancaster and Woodruff paper in this report, under the section, "Basic Organizational Structures." Similarly, to the mixed structure described in that section of planning activities from the modes are combined into a DOT planning activity. Other modal functions are usually untouched.[10/]

RuBino[11/] in his basic work in the literature on State DOT's includes six structures which can be classed as either mixed or functional (figure 1). His types I through III can be classified as mixed forms, but note that if the divisions are modes then the arrangements could be considered as high modal. On the other hand, if the divisions are functional types, the organizations are low modal. Similarly, RuBino's types IV through VI are mixed and high modal if the divisions are modes or function and low modal if the divisions are functional.

DELEGATION OF AUTHORITY

RuBino went beyond the simplistic discussion of the three organizational forms to recognize that decision and policymaking authority along with functional or modal relationships must be considered in any discussion of DOT structures. In types I and IV, authority is quite clearly positioned in the secretary. In types II and V, policymaking authority resides in the board. In types III and VI, the board is described as having authority limited to an individual mode which may include the power to make policy for that mode. Also, such boards may have authority over only a portion of a mode. Boards or commissions overseeing particular bridges or freeways as opposed to the total State highway system are examples of this situation.

10/ Goodman, William I., and Harris, Arnold, "State Departments of Transportation: The Institutional Road to Achieving Multimodal Planning," Planning and Public Policy, November 1976, page 3.

11/ RuBino, R. G., "A Quest for Integrated and Balanced Transportation Systems in State Government," NTIS, Document PB-203907, Florida State University, page 17.

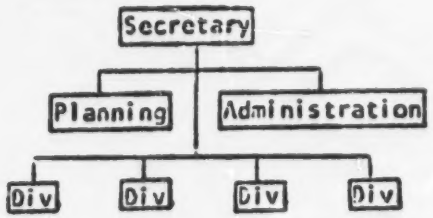
BEST DOCUMENT AVAILABLE

GENERALIZED TYPES OF STRUCTURE -
ORGANIZATION OF STATE DOT'S

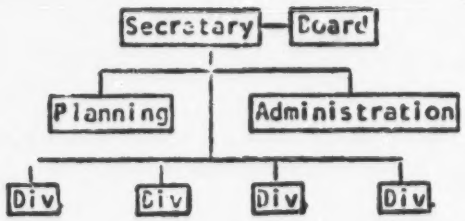
Single Executive	Plural Executive	Decentralized

Hierarchical Order:

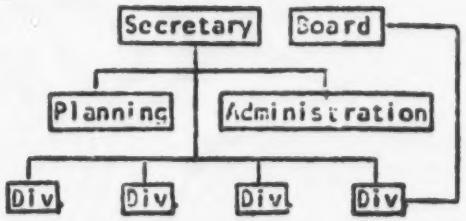
Type I



Type II

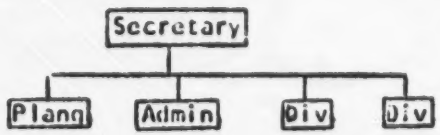


Type III

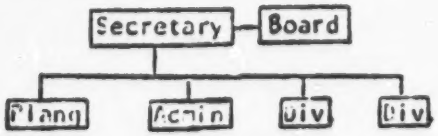


Equipotential Order:

Type IV



Type V



Type VI

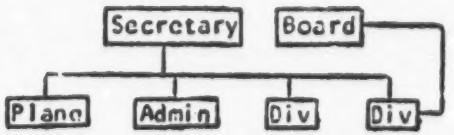


Figure 1

Single executive - agency head has full policy-making authority.
Plural executive - transportation board has policy-making authority
Decentralized - modally oriented board or boards have some policy-making authority; transportation board may or may not exist.
Hierarchical order - agency head utilizes certain units as staff arms to assist in management of operating line units.
Equipotential order - staff and line units purposefully positioned to avoid inequality in relationship to agency head.

CONCLUSIONS

As with many complex governmental issues, the determination of how to organize a State DOT may very well be more a function of pragmatism than of organization theory. Nevertheless, the following are desirable characteristics for a DOT and organizational arrangements which may lead to these characteristics:

1. Make decisions quickly - The agency should be responsive to daily problems both in terms of improving the transportation system and in terms of the day-to-day administration of the agency. This suggests that there should be a single executive. This chief executive should be empowered to carry out day-to-day activities within the policies of the agency.

2. Various views, modes, and interests should be represented in decisionmaking - The DOT needs to ensure itself that its policies and general approaches to problem solving are reasonable and politically realistic. An advisory board would seem to have the potential for providing the necessary tests of realism. The problem with creating such a board is determining how members would be selected. Should they be "typical" citizens? Should they represent a particular mode's interest? Should they represent an interest group? Ideally, all three viewpoints should be continually present on the board.

3. Define decisionmaking authority - The chief administrator's authority should be defined as what he or she cannot do with the implication that all other actions are allowable. If there are any administrative boards in the DOT, such as toll authorities, their relationship to the administrator should be defined in detail.

4. Coordinate and control modal plans - A major impetus for creating DOT's was to assure that the various modes are developed in a coordinated fashion. Utimately, control may have to be exercised over the plans promoted by various modal interests through programing and budgeting processes. This suggests that all planning be located outside the modes as a functional activity and be able to determine the level of modal shares of funding.

As any DOT organization will bear the imprint of its environment, it is unlikely that any organization will have all the attributes discussed here. Hopefully though, this paper gives some ideas of the attributes an ideal organization might have.

REFERENCES

Cavanagh, J. E., Haas, W. L.. Lewis, R. S., Rehberger, E. H., and Famous, P. State Highway Administrative Organizations, An Analysis, Special Report 51. Highway Research Board, 1959.

Goodman, William I., and Harris, Arnold. "State Departments of Transportation: The Institutional Road to Achieving Multimodal Planning" Planning and Public Policy. November 1976.

RuBino, R. G. "A Quest for Integrated and Balanced Transportation Systems in State Government" NTIS, Document PB-203907. Florida State University.

BLANK PAGE

THE ROLE OF PLANNING IN STATE TRANSPORTATION ORGANIZATIONS[1/]

Much of the reasoning behind the support for departments of transportation sprang from a belief in the planning/coordinative ability of such organizations.[2/] The coordination is accomplished through three levels of planning: policy, system, and project and through the specific planning activities of programing and surveillance and evaluation.

PLANNING

Defining the three levels of planning illustrates their differences. Policy ". . . planning is the selection of coordinated policy decisions, leading toward the achievement of a defined set of goals and objectives."[3/] Central to this definition of policy planning are seven objectives:

1. A plan, dealing with the statewide development of transportation and emanating from a determination of existing conditions.
2. Coordination of those methods used in plan implementation such as taxation and regulatory policies.
3. Coordination of transportation with economic policy.
4. Coordination of transportation with State land use policies.
5. Maximizing benefits to the public while minimizing costs within budgetary limits.
6. Determination of modal networks appropriate to the State interest and within which towns and cities may formulate their own policies.
7. Development of investment strategies that consider optimization of State benefits as opposed to local interests. This objective can be met through the program development and budgeting process.

[1/] Edited from a draft paper with this same title by Edward N. Kashuba, Federal Highway Administration, U. S. Department of Transportation, Washington, D.C., December 1978.

[2/] Kashuba, Edward N., and Blow, Philip W., "Considerations in Organizing State Transportation Agencies." This is in this report beginning on page 64.

[3/] Ashford, Norman, "The Planning Function in State Departments of Transportation," Traffic Quarterly, January 1973, page 57.

The first objective mentioned above for policy planning overlaps some of the objectives of system planning which are discussed later in this paper. The major difference between the policy planning objective and related system planning objectives is largely one of emphasis. Policy planning relates unimodal and multimodal systems to important State issues such as economic well being, resource conservation, health care, and education. Within system planning the development of a system or systems is central to the mission of the agency and not the relationship of transportation systems to other State operated or supported systems.

System planning has these seven objectives:

1. Data collection for determining needs and developing design information.
2. Statewide system planning from mulitimodal networks including terminal facilities.
3. Design of a network of transportation corridors considering modal balance and the State's available resources.
4. Design of optimal single mode networks.
5. Technical assistance to local transportation agencies.
6. Conduct of local and regional public transportation studies.
7. Determination of the enviornmental impacts of system level proposals.

Project planning has three objectives:

1. Scaling the design of the facility to the expected demand.
2. Assessing environmental impacts of a facility.
3. Relating the overall corridor planning demands to the individual project.[4/]

Given the objectives of the three levels of planning, three factors should be considered in determining where to place each level within an organization.

[4/] Sturm, Byron D., "Resource Paper, Organization and Administration for Statewide Transportation Planning," Issues in Statewide Transportation Planning, Special Report 146, Transportation Research Board, 1974, pages 41-42.

First, planning may be either a line or staff function within a State DOT. As a "line" function, its managers and staff are in the direct line of command within the organization hierachy. Planning managers issue orders and work at tasks relating directly to the organization's functional objectives.[5/] This concept is illustrated in RuBino's DOT organizations IV through VI.[6/] The positioning of planning as a line or operating division orients it toward operations as opposed to it being oriented toward policy. As a line function, planning tends to function for its own purposes rather than to support other organizational units.

As a staff function, planning does not exercise authority over other elements of the agency but rather it provides support to the line of divisions.[7/] This is illustrated in RuBino's types I through III.[8/] As such the planning staff provides advice to the agency policymakers. This early, close involvement of planning in these agency operations is necessary if planning is to effect policies.

The literature offers no clear indication on whether planning should be a line or staff function. RuBino suggested that planning be a staff position where it can be responsive to both management and line operating units. Ashford[9/] points out that this centrist approach assumes that there is a homogeneity among planning tasks that really does not exist. For example, consider the variation in the tasks grouped under policy planning and the tasks under project planning.

First the line or staff relationship of planning to the rest of the organization as suggested above has a psychological importance that may be more significant than the effect that it will have on the actual planning mission. Policy planning could be carried out by a line planning division but the impact of its studies could be lost on top management. Further, policy planners in a line position may not recognize top management's need for policy information.

[5/] Pfiffer, James M., Public Administration, The Ronald Press Company 1946, page 84.
[6/] Kashuba, Op. cit. page 69.
[7/] Pfiffer, Op. cit.
[8/] Kashuba, Op. cit.
[9/] Ashford, Op.cit., pages 51-54

Second, modal planning needs to introduce other variations in planning activities. For example, State involvement with highways has been extensive, and highway system and project planning may be needed more than policy planning. Railroads, on the other hand, have historically been handled through the private sector with only traffic regulation by the State. The only recent State involvement with railroads suggests that the need for policy planning is as significant as the need for other planning -- if not more so.

Third, centralizing planning may lead to an overemphasis on the highway mode. Highway elements dominate other organizational elements in DOT's that include the highway mode. This dominance results from the number of employees, the dollar value of the programs, and political influence. Furthermore, many of the major operating officers of the new DOT's have had extensive experience in the highway field. Consequently, their interests often are still centered on highway problems and the potential of other modes may not be as carefully evaluated as they might otherwise be.

Because of these three factors, Ashford suggests policy planning be a staff function and system planning, a line function in the organization. The policy planning staff would assist in getting appropriate planning information to the agency decisionmakers and help translate policy directives into actions necessary for meeting policy objectives. The system planners being on line would help evaluate the directives from the policy planning staff and determine appropriate modal strategies to complement a particular policy.[10/]

The Williamsburg Conference on Statewide Issues differed slightly from Ashford. It concluded that for most State DOT's a staff level planning unit containing policy and multimodal systems planning functions represents the most logical and efficient alternative. The conferees felt that policy planning should not take place in a void but should draw on previously completed system planning studies for hard information.[11/]

[10/] Ibid.

[11/] Transportation Research Board, Workshop I, "Organization and Administration for Statewide Transportation Planning," Issues in Statewide Transportation Planning, Special Report 146, 1974, page 31.

It is clear from the objectives of project planning that project planning should be on line within the project development unit of a particular modal element.

PROGRAMING

Programing has been defined as the matching of available projects with available funds to accomplish the goals of a given period.[12/] In the context of this paper, it is necessary to know where the programing function should be placed in the organization. Recent literature on programing conceives of it as a planning function.[13/] In the earlier discussion on policy planning two objectives, maximizing public benefits within budgetary limits and development of investment strategies that optimize State benefits as opposed to local interests, were noted. But, both of these objectives are met in the program development process. Logically, then the policy planning unit should be responsible for programing.

This paper recognizes that in many transportation agencies the programing and planning activities are in different organizational elements. Unfortunately, "... in some agencies the planners appear to have abdicated responsibility for implementing their long-range objectives by seeking to accomplish specific goals in a short-range program. In other agencies the programing process is considered the prerogative of the decisionmakers or of a small clique around the department head who want to make the final decisions."[14/] Programing is ultimately a subjective and even political decision process, however, the program decision should nevertheless be the culmination of an orderly planning process. If "...programming is not divorced from planning but is seen as the pivotal implementation step in the planning process, then it is planning and not a separate programming function that leads to the political decisions."[15/]

[12/] Campbell, Bruce, Synthesis of Highway Practice 48, Priority Programming and Project Selection, National Cooperative Highway Research Program, 1978, page 28.
[13/] Ibid, page 29.
[14/] Ibid.
[15/] Ibid.

SURVEILLANCE AND EVALUATION

Two of the emerging activities being undertaken by State DOT's are surveillance and evaluation. These were referred to at the 1974 Williamsburg Conference on Statewide transportation planning as the "lookout" and "mobilization" functions.[16/] The surveillance or "lookout" function monitors transportation system performance and provides early warning for emerging problems or issues, especially those related to the agency's policies and objectives. The conference felt that this function was a system planning responsibility. Once a problem or issue is identified, evaluation and "mobilization" must take place. The policy planning staff would evaluate the issues, determine those needing an immediate response and indicate the appropriate organizational units to formulate the necessary response.

CONCLUSIONS

1. Whether or not planning should be a line or staff function is not as important as insuring that planning has a very visible place in the organization. Planning as a staff function responsive to the chief executive would certainly provide such visibility, but the impact of planning on the organization could be equally as great if it were a line group with good communication with the executive.

2. Too often the comment is made by members of planning staffs that no one pays attention to their activities, particularly when the capital program is being put together. It has been noted that part of this problem occurs when planners surrender their responsibility to be involved in program decisions. As a result, planning activities may not be directed toward providing the types of information needed in programing. To overcome the separation between planning activities and programing activities, both activities should be in the same functional group. The organizational and physical proximity of the two activities should create an awareness in the manager of how they may best complement each other.

16/ Transportation Research Board, Op. cit., page 32.

3. Large amounts of data are collected, and logically it is assumed that this data will assist in solving problems. Unfortunately, the thoughtfull evaluation of trends is often overlooked. The head of one State planning organization has pointed out that planners do a great deal of surveillance but very little evaluation. Therefore, evaluation should be the responsibility of the policy planning group to ensure that evaluation is a part of the long term planning of the agency.

4. An organizational unit should be responsible for (1) measuring system performance; (2) evaluating issues noted through surveillance; (3) proposing the mission, goals, and objectives for the agency; (4) coordination of programs with other local, State, and Federal agencies; and (5) developing new programs or reorienting existing ones.

REFERENCES

Ashford, Norman. "The Planning Function in State Departments of Transportation," Traffic Quarterly. January 1973.

Campbell, Bruce. Priority Programing and Project Selection, Synthesis of Highway Practice 48. National Cooperative Highway Research Program, Transportation Research Board, 1978.

Pfiffer, James M. Public Administration. The Ronald Press Company, 1946.

Strum, Byron D. Resource Paper, "Organization and Administration for Statewide Transportation Planning," Issues in Statewide Transportation Planning, Special Report 146. Transportation Research Board, 1974.

Transportation Research Board. Workshop I, "Organization and Administration for Statewide Transportation Planning," Issues in Statewide Transportation Planning, Special Report 146. 1974.

* U.S.G.P.O. 522-046/1307-8459